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ERRATA

VOLUME XXIII

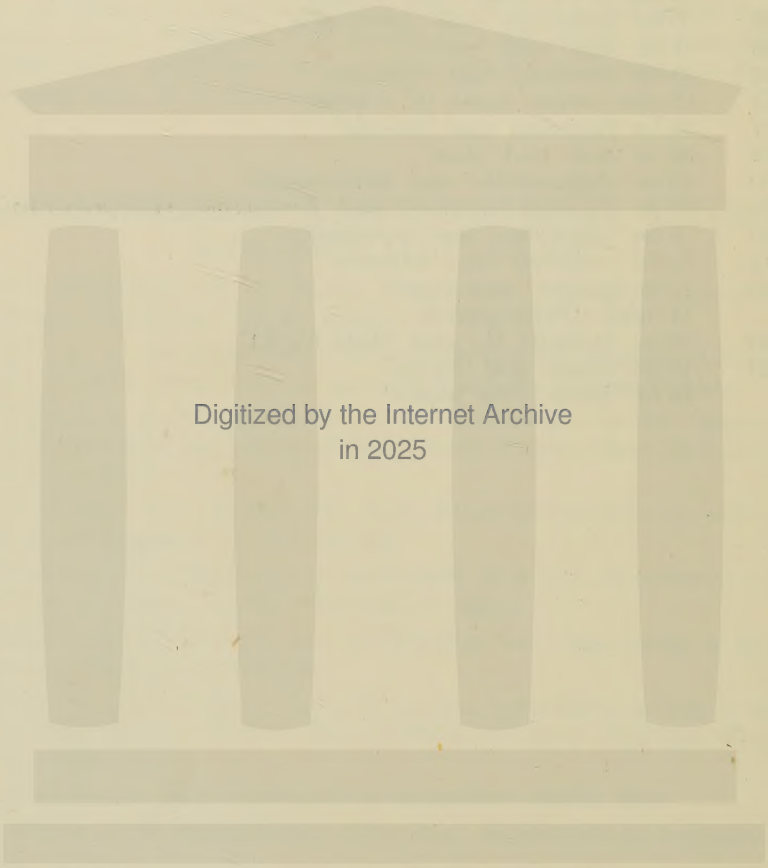
page 290 line 9 and 42 for '*palmivora*' read 'sp.'

VOLUME XXVII

346 20 after 'groundnut,' insert 'and'
21 before 'spinach' insert 'and in Denmark on'
438 35 for '*bourdotti*' read '*bourdotii*'

VOLUME XXVIII

31 22 for '*Asochyta*' read '*Ascochyta*'
25 and 49 for '*elaedis*' read '*elaeidis*'
38 50 for '*Sphaeropis*' read '*Sphaeropsis*'
98 21 for 'xxvii' read 'xxvi'
108 48 for 'Sevrétain' read 'Segrétain'
161 12 after '*striata*' insert '[*C. saltiana*]'
197 38 for '*funicolum*' read '*funicola*'
289 39 for 'seed' read 'plant'
300 25 for '*dichomotische*' read '*dichotomische*'
336 51 for '*Xanthomonas pruni*' read '*Pseudomonas mors-prunorum*'
393 3 for 'paranthion' read 'parathion'
444 45 for '*uniformis*' read '*unicornis*'
510 13 for 'paeony' read 'peony'
14 delete '[*Pyrenopeziza*]'
548 28 for 'Gadd (G. H.)' read 'Gadd (C. H.)'
623 15 for 'Kenja' read 'Kenya'
16 for 'blancs' read 'blanco'



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COMMONWEALTH MYCOLOGICAL INSTITUTE

REVIEW
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ZAUMEYER (W. J.) & THOMAS (H. R.). **Pod mottle, a virus disease of Beans.**—*J. agric. Res.*, lxxvii, 3, pp. 81–96, 4 figs., 1948.

During 1945 severely mottled pods were observed on several bean (*Phaseolus vulgaris*) plants of the Tendergreen variety near Charleston, South Carolina. The causal virus is new and has been named bean pod mottle virus or *Marmor valvolarum*. It is very similar to southern bean mosaic virus [*R.A.M.*, xxiii, p. 203] and produces local lesions on some varieties and systemic mottle on others, a different varietal reaction being observed for each type of infection. The local lesions differ from those caused by any other virus so far reported. They are somewhat circular in shape and measure 1 to 2·5 (average 2) mm. in diameter, are lighter brown and more diffuse than those produced by the southern bean mosaic virus, and appear three or four days after inoculation. Their size varies with the variety, the age of the inoculated leaf, and the number of lesions per unit area. The vascular tissue becomes necrotic when the lesions occur near the veins.

The systemic-mottle symptoms of pod mottle are generally more intense than those of southern bean mosaic, and on varieties such as Longreen and Tendergreen are more severe than those of common bean mosaic. The range of symptoms includes those produced by common and southern bean mosaic: infected leaves of very susceptible varieties are malformed and mottled and sometimes show considerable chlorosis but no puckering or blistering. The trifoliate leaves of varieties such as Full Measure and Tendergreen are both mottled and necrotic and may die. Infected pods of many susceptible varieties are severely mottled and are a darker green than normal. They are also shorter than normal, extremely malformed, and often contain abortive or abnormally developed ovules.

In one inoculation experiment 24 Idaho Pinto leaves sprayed with the pod mottle virus at pressures of 5, 10, 20, and 25 lb. became infected, the average number of local lesions produced being 3, 4, 23, and 25, respectively. Five times as many lesions per leaf were produced by spraying with the southern bean mosaic virus. Local lesions were produced by handling first systemically infected plants and then healthy plants susceptible to local infection. More abundant lesions were produced by the southern bean mosaic virus, indicating that it is more infectious than pod mottle virus. The lesions on simple leaves inoculated 12 to 14 days after planting measured 1·5 to 2 mm. in diameter, while those produced 19 to 21 days after planting were very sparse and small. Numerous, medium-sized lesions were produced on trifoliate leaves inoculated at the same time. Similar reactions were observed with southern bean mosaic virus up to 16 days after planting.

The optimum temperature for the production of local lesions by the pod mottle virus was 22° C.; none appeared at 10°.

Of 68 varieties or strains of beans inoculated, 41 were homozygous for susceptibility to local-lesion infection, 23 were homozygous for susceptibility to systemic infection, and 4 were heterozygous. Most of the green-podded snap and dry beans were susceptible to local infection and most of the wax-podded

varieties susceptible to systemic infection. The majority of the green-podded bush varieties of snap beans reacted in different ways to the pod mottle and southern bean mosaic viruses, while most of the green-podded pole varieties and dry bean varieties reacted in the same way to both viruses. Practically all the varieties resistant to common bean mosaic virus were susceptible to local infection by the pod mottle virus. The sieva lima bean (*P. lunatus*) and a hybrid between *P. lunatus* and *P. lunatus* f. *macrocarpus* were susceptible to local infection of the pod mottle virus, while the Fordhook types were immune. Eleven varieties of soy-bean were the only other susceptible hosts found among 25 species representing 20 genera in 9 families.

The pod mottle virus was inactivated at between 70° and 75° C. (when heated for ten minutes), at a dilution of 1 to 100,000, by a 1 to 250 nitric acid solution, and after ageing for 93 days at 18°. It was active at a dilution of 1 to 10,000, resisted ageing for 62 days at 18°, and was still infectious after a 30-minute treatment in 95 per cent. alcohol, in a 1 to 100 solution of 37 per cent. formaldehyde, and in a 5 per cent. sodium chloride solution.

Immunological studies showed no relationship between the pod mottle, southern, and common bean mosaic viruses.

Atkins (F. C.). **Two Verticilliums parasitic on Mushrooms.**—*Gdnrs' Chron.*, Ser. 3, cxxiv, 3215, p. 60, 1948.

The two *Verticillium* species attacking the cultivated white mushroom, *V. malthousei* [*R.A.M.*, xxvii, p. 592] and *V. psalliotae* [ibid., xxvii, p. 109], are described. The symptomatology and scientific descriptions of the parasites are given; the spores of both show similar behaviour during development.

Branas (J.). **La dégénérescence infectieuse de la Vigne est une maladie à virus.** [Infectious degeneration of the Vine is a virus disease.]—*C. R. Acad. Agric. Fr.*, xxxiv, 6, pp. 301–302, 1948.

In the summer of 1944 two Rupestris du Lot vines growing at Montpellier were selected, one of which, D, showed marked degeneration [court noué: *R.A.M.*, xxvii, p. 408] (disease rating 4 out of 5 points), the usual mosaic found on this variety, and branch fasciation with double nodes, while the other, S (disease rating 0·5 out of 5 points), showed only a slight tendency to leaf malformation. On 3rd March, 1945, cuttings 40 cm. long from both vines were potted in soil from a park in which vines had not been grown for 75 years and left in the open air. On 15th November, 1946, samples of each clone in the same pots were transferred to a hothouse. In January, 1947, grafts of S were made on to S and D, and of D on to D and S. In addition, three D on S individuals were decapitated below the graft union on 17th April, 1947. On 5th January, 1948, six S individuals were decapitated half-way up the stem but not grafted, and on 2nd February six D on S individuals were decapitated below the graft union.

Observations showed that all the individuals of a given clone maintained without appreciable variation the same condition of health which was identical with that of the mother vine from which they came. Mosaic, leaf malformations, fasciation, and double nodes normally appeared on D plants in the hothouse. In general, however, S and D plants in the hothouse had longer internodes and (apparently) larger leaves than those in the open air. Decapitation induced no change in the S plants. All the S on S grafts continued in very good health. Of the D on D grafts only two survived, and their state of health resembled that of the ungrafted D plants. In the S on D grafts the healthy scion at once became diseased, mosaic developing first, though leaf malformation and fasciation were not present from the base of the branches up to about one-third of the length. In the D on S grafts the scions were markedly degenerate. The effect of decapitation of the D on S

plants was as follows: the shoots of the stock 12 months after grafting displayed all the degeneration symptoms apparent on the ungrafted clone D; two of three plants grafted for only 70 days were similar, while the third showed only severe mosaic, which became almost like scorching on some leaves.

These results demonstrate that the symptoms of degeneration persisted in all individuals obtained by the fragmentation of the mother-vine which itself presented these symptoms. These characters passed to the graft in the direction of stock to scion and also from scion to stock, but after a different period of contact. In either direction, mosaic appeared more rapidly after passage than the other symptoms. The data obtained thus afford striking confirmation of the view that infectious degeneration of the vine is caused by several viruses.

[This paper also appears in *Progr. agric. vitic.*, cxxix, 23–24, pp. 337–339, 1948.]

Borzini (G.). **Relazione sulle esperienze di lotta contro la 'Peronospora della Vite' (Plasmopara viticola) espletate nell' azienda 'Frecciarossa' (Casteggio) nel 1947.** [An account of experiments on the control of Vine *Peronospora* (*Plasmopara viticola*) carried out on the Frecciarossa (Casteggio) estate in 1947.]—*Circ. Centro Studi Anticritt. Pavia* 35, 5 pp., 1947. [Mimeographed.]

In comparative spraying tests against *Plasmopara viticola* [*R.A.M.*, xxv, p. 538; xxvii, p. 553] carried out near Pavia in 1947, 520 'Barbera' vines were sprayed with mixtures containing reduced amounts of copper or with Bordeaux mixture. Infection was very light owing to the prevailing weather conditions, and the average infection ratings for the young leaves were as follows: 1 per cent. Bordeaux mixture (24 per cent. copper) 1·66, 0·66 per cent. Bordeaux (18 per cent. copper) 2·5, 0·5 per cent. Bordeaux (12 per cent. copper) 2·66, untreated 2·66; the corresponding figures when the first-named was replaced by cupramina [ibid., xxii, p. 287] (12 per cent. copper) being 0·75, 2·25, 3, 3; by ramital [Casale's mixture] (12 per cent. copper) 1·25, 1, 2, 2·5; by R[ame] S[andoz] Montecatini (12 per cent. copper) 2·5, 1·25, 3, 3·25; by R.P. 12 (12 per cent. copper) 1·25, 2·25, 3, 2·75; and by Rame [copper] Sandoz (17 per cent. copper) 0·5, 0·5, 1, and unsprayed 3.

The data obtained show that cupramina and R.P. 12 protected the leaves at least as effectively as Bordeaux mixture 0·66 per cent., in spite of the higher copper content of the last-named. Casale's mixture was slightly less effective, but was better than 0·5 per cent. Bordeaux. R.S. and copper sandoz were about as good as Bordeaux mixture containing the same amount of copper. Further work is in progress.

Melchers (G.). **Phytopathogene Viren.** [Phytopathogenic viruses.]—FIAT Review of German Science 1939–1946, Biology I, pp. 111–129, 2 figs., 1948. Published by Office of Military Government for Germany Field Information Agencies, Technical.

The section on virus and the plant (pp. 117–126) in this comprehensive summary of German plant virus research from 1939 to 1946 covers the analysis of the process of infection, the multiplication and spread of viruses [*R.A.M.*, xxii, p. 400] and the defence reaction of the plant, and the physiology and development of symptoms [ibid., xxi, p. 466]. The third section (pp. 126–129) deals with newly described viruses, some of which have already been noticed in this *Review* [ibid., xxiii, p. 460].

Among the new viruses (Köhler (E.) & Panjan (M.) in *Ber. dtsch. bot. Ges.*, lxi, p. 175, 1943), paramosaic virus of tobacco occurs in Baden and differs from tobacco mosaic in causing indistinct, chlorotic lesions on primarily infected leaves of *Phlox drummondii*, and small, yellowish-white ones on beet. White Burley tobacco develops brown necrotic primary lesions without subsequent symptoms. The leaves of infected Samsun tobacco often show necrotic oak-leaf patterns along the veins

similar to those caused by ring spot. White Burley cannot be infected with paramosaic if already containing tobacco mosaic. On the other hand, in plants infected with paramosaic an aucuba variation of tobacco mosaic can develop, forming mixed symptoms with the paramosaic virus.

JOHANSEN (GUDRUN). **Svampeangreb af særlig Interesse.** [Fungal infections of particular interest.]—*Maanedl. Overs. Sygd. Kulturpl., 1948*, 300, pp. 102–104, 1 fig., 1948.

During the latter part of July, 1948, reports were received from all parts of Denmark of a soft brownish-yellow rot of potato stems associated with *Botrytis cinerea*. Bintje was the variety chiefly affected, but there were also occasional attacks on King Edward. The pathogen commonly develops when the tops are withering and its occurrence at the above-mentioned early date is very unusual. Inoculations with two isolates of *B. cinerea* from different localities were performed through wounds on (*a*) Bintje plants just beginning to wither and (*b*) Up-to-date in a planting experiment comprising five dates, namely, 21st April and 1st, 11th, 21st, and 31st May. Ten Bintje stems were inoculated on 27th July, ten on 5th August, and ten were left intact. Three Up-to-Date stems of each planting date were inoculated both on 27th July and 5th August, while four in each lot were left intact. On 25th August seven of the Bintjes inoculated with one isolate and all those with the other were overgrown by the mould round the site of infection and the stems were quite rotten. The remaining three and a number of the controls were free from grey mould but harboured a species of *Vermicularia* [*Colletotrichum*: *R.A.M.*, viii, p. 268]. Inoculated Up-to-Dates of the first three planting dates bore light brown, sunken, black-edged lesions, 1·5 to 18 cm. in length, either on the inoculated side or completely girdling the stems, the latter resulting in the death of the plants. All the controls were healthy. The lesions on the Up-to-Date stems of the two latest planting dates were mostly insignificant, the fungus preferring the more mature plants of the earlier series in this variety and being particularly addicted to the precocious Bintje. A measure of control may be obtained by spraying with Bordeaux mixture, but in severe attacks the tops should be removed and burnt.

Fusicladium depressum [ibid., xxvi, p. 328] was reported, for the first time from Denmark, on seed stems of dill in 1942, and in September of the current year it recurred in a severe form, producing oblong spots on the leaves and between the stem ribs. At first the colour of the lesions is greyish to whitish, but on the rupture of the epidermis the dark hyphae and conidia impart a dark brown to black tinge to the infected areas.

Phyllosticta solitaria was detected on a Graasten apple petiole from Fünen. It is unlikely to prove as destructive in Denmark as in the United States, since the prevailing conditions in the former country do not fulfil its requirements in respect of temperature (minimum 8° to 12° C., optimum 26° to 29°, according to Mix) [cf. ibid., iii, pp. 521, 657].

Annual Report, Cawthron Institute, Nelson, New Zealand, 1947–8.—38 pp., [1948].

It is stated in this report [cf. *R.A.M.*, xxvii, p. 116] that during the period under review Delicious apple trees in an orchard of the Cawthron Institute, New Zealand, showed a marked chlorosis [ibid., xxvi, p. 230], the tip leaves especially being affected, but all leaves on the leaders also showed distinct yellowing. Treatment with iron sulphate immediately corrected the condition. Chemical analysis of leaves of Tasman and Braeburn apple trees, which had received heavy applications of magnesium compounds in previous years, showed a magnesium content of 0·3 per cent. compared with 0·14 per cent. for the untreated [ibid., xxvii, p. 117]. Cox's Orange apple trees in the Tasman–Mariri locality suffer to an increasing ex-

tent from a disease known locally as collar rot. Examination revealed the presence of *Erwinia amylovora* [ibid., xxvii, p. 138] and several fungi, of which *Valsa leucostoma* and an unidentified species were the most common. The pathogens gain entry into the trunk at ground-level, but a canker occurs sometimes higher on the stem. It spreads rapidly and may cause the death of the tree within two years.

Studies of the incidence of 'cloud' [ibid., xxvi, p. 232] in Nelson tomato houses indicated that tomatoes planted in October were shorter, had fewer leaves, a lower yield, but better quality fruit, and showed 1·1 per cent. of the disorder, while those planted in August had 9·1 per cent. 'cloud'. No correlation existed between 'cloud' and the manganese and iron status of tomato.

A survey of commercial tomato gardens in Nelson revealed the widespread incidence of 'hard core'. The use of chloropicrin as a soil disinfectant reduced the condition to an almost negligible amount. The plots treated with sheep manure and cacao bean husks in the previous season did not show such beneficial results in the second season when no fresh application was made. 'Hard core' incidence was least in areas where the status of exchangeable potassium was high.

In trials for the resistance to black root rot of tobacco (*Thielaviopsis*) [*basicola*: ibid., xxvii, p. 117] Little Dutch showed marked resistance, 62 per cent. of the young plants being free from infection in a heavily infested soil. Infection was comparatively slight in Harrison Special 215, Special 400 and 401, and Oxford 26. Investigations into the sources of black root rot infection revealed that top-dressing sand harboured the causal fungus, which was found also at several of the sites where sand is obtained. Black root rot soil infestation was associated with a plant cover of gorse [*Ulex europaeus*], broom [*Cytisus scoparius*], and clover, but not with tall fescue [*Festuca elatior*]. The importance of steam sterilization or chemical treatment of all soil used for tobacco seedling beds is emphasized.

Dey (P. K.). **Plant pathology.**—*Adm. Rep. agric. Dep. U.P., 1945–1946*, pp. 43–46, 1948.

In this report [cf. *R.A.M.*, xxvi, p. 440] R. S. Mathur states (p. 23) that sugarcane red rot [*Physalospora tucumanensis*] destroyed from 10 to 50 per cent. of the Co. 312 crop in the eastern United Provinces and also affected Co. 370, Co. 300, Co. 290, Co. 331, and Co. 385. Wilt [*Cephalosporium sacchari*: ibid., xxii, pp. 153, 197] damaged 5 to 10 per cent. of the Co. 370, Co. 513, Co. 312, Co. 356, and Co. 395 plants in the calcium-deficient soils of Gorakhpur district. Smut [*Ustilago scitaminea*: ibid., xxiii, p. 407] also caused appreciable damage. The 19 improved and six desi varieties tested at Shahjahanpur all appeared fairly resistant to wilt and Co. 313, Co. 453, CoS. 306, CoS. 302, CoS. 254, CoS. 222, CoK. 30, and Co. 356 least susceptible to red rot. At Gorakhpur the varieties least susceptible to red rot were Co. 421, Co. 370, Co. 453, and Co. 393 and all the improved and desi canes except Co. 290 were practically free from wilt.

Breeding work directed by T. B. Sabnis (p. 31) showed that linseed type 1193–2 possesses resistance to rust [*Melampsora lini*: ibid., xxiv, p. 128].

The same worker, in collaboration with the Government Plant Pathologist, United Provinces, reports (p. 34) that in the course of breeding varieties of arhar [pigeon pea] resistant to wilt [*Fusarium udum*: ibid., xxvii, p. 155 and below, p. 46], the mortality among nearly all of the 30 strains tested in a heavily and uniformly infested field was lower than in the previous year. The newly-bred wilt resistant strains 17–W/2 and 51–W/1 were tested on a field scale against T 66.

F. udum on pigeon pea was again reduced, this time from 64 to 29 per cent., by growing the crop with sorghum, and from 71 to 51 per cent. by growing in soil containing sorghum stubble. Ten highly wilt-resistant strains underwent severe greenhouse and field tests under conditions of heavy infestation.

The results of all-India co-operative experiments carried out at Cawnpore,

Meerut, and Gorakhpur to determine the efficiency of five fungicides in controlling grain smut of jowar [sorghum, *Sphacelotheca sorghi*: ibid., xxvii, pp. 18, 315] showed that agrosan G was significantly superior to the others. In an attempt to minimize the damage from the disease, packets of this fungicide were distributed free of cost to 12 seriously affected districts of the United Provinces.

Potato virus diseases [unspecified] were effectively controlled by roguing in the field and incidence reduced from 6 to 0·9 per cent. A scheme of the Indian Council of Agricultural Research, for the production of certified stocks of virus-free seed tubers, is operating in the United Provinces.

Phyllody [ibid., xvii, p. 554] and *Alternaria* [? *sesamicola*: ibid., xxiii, p. 410] were recorded for the first time on til [sesame]. *F. lini* caused considerable damage to local linseed varieties at Cawnpore, Benares, Jaunpur, and Mirzapur. Leaf spots caused by *Alternaria* sp., *Cercospora ricinella*, *Cladosporium* sp., and *Phytophthora parasitica* were observed on castor [*Ricinus communis*], the last-named causing considerable damage by killing seedlings and inducing leaf blight of young plants.

A *Fusarium* wilt disease was noticed for the first time, causing considerable damage to all the lentil strains at the Research Farm, Cawnpore; it has also been reported from the Government Farm, Attara (Banda).

The intensity of latent infection and storage rot was significantly reduced at Chaubattia by spraying unripe apples once with Bordeaux mixture (2–10–40). Apricot seedlings suffered considerable damage from powdery mildew (*Podosphaera* [*oxyacanthae* var.] *tridactyla*) [ibid., xv, p. 557], recorded for the first time from the Siahi Devi Estate, Almora.

A species of *Cephalosporium* was invariably isolated from the roots of guava plants dying from a serious die-back and wilt disease affecting plantations at Allahabad, Cawnpore, and Lucknow. A scheme for the control of the potato ring [rot] disease (*Corynebacterium sepedonicum*) [ibid., xxii, p. 48], which was again isolated, has been submitted to the Government.

Swainson (O. S.). **Annual Report of the Department of Agriculture, Zanzibar Protectorate, 1947.**—55 pp., 1 graph, 1948.

In this report [cf. *R.A.M.*, xxvii, p. 276] it is stated that the yield of Liberica coffee was very disappointing in Zanzibar during 1947. *Hemileia vastatrix* again caused much damage. Of the ten cassava varieties imported from Amani in 1936 Aipin valenca and 4026/20 are apparently reasonably resistant to mosaic and [brown] streak [viruses: ibid., xix, p. 580; xxvi, p. 281] and are heavy yielders. Small blocks of these two have been replanted from disease-free plants. Several thousand true seeds of the Msitu variety were again planted, and the seedlings are being rogued as virus symptoms occur. There were no important developments in clove investigations [ibid., xxvii, p. 276] during the year.

Annual Report of the Massachusetts Agricultural Experiment Station for the fiscal year ending 30th June, 1947 (Bulletin 441).—72 pp., 1947.

The botanical section of this report [cf. *R.A.M.*, xxvi, p. 378] contains the following items of phytopathological interest. Continuing their work on Dutch elm disease (*Ceratostomella ulmi*) [ibid., xxvii, p. 300], M. A. McKenzie and A. V. Osmun state that up to 8th July, 1947, the pathogen had been isolated from 502 trees in eight counties. Spray materials for the control of the vectors (*Scolytus multistriatus* and *Hylurgopinus rufipes*) are being investigated. Among other tree disease reports during the period were two of *Cephalosporium* wilt of elm [*Dothiorella ulmi*: ibid., xviii, p. 557 *et passim*] and one of needle blight of Colorado fir (*Abies concolor*) caused by *Rehmiellopsis balsameae* [ibid., xxiv, p. 391].

W. L. Doran found that improved rooting of summer cuttings was obtained when hormodin No. 3 was mixed with 15 per cent. zinc ethylene bisdithiocarbamate

(HE 178 E), fermate, or zinc mercaptobenzothiazole for leaf bud cuttings of a *Rhododendron catawbiense* hybrid; diphenyl guanidine phthalate (guantal) for *Viburnum carlesii*; fermate for flame azalea [*R. arboreum*]; phygon for *Cotoneaster adpressa* and *V. burkwoodii*, and HE 178 E for red cedar [*Thuja plicata*]. Arasan protected seedlings of *Pinus mugo* var. *mughus* better against damping-off than did phygon or spergon. Used immediately before seeding, arasan, 0·5 gm. per sq. ft., improved the stands of Carolina rhododendron [*R. carolinianum*] and *R. catawbiense* hybrid. Fermate and tuads, applied to soil in fertilizer before seeding [cf. ibid., xxvii, p. 213], gave better control of onion smut [*Urocystis cepulae*: ibid., xxvi, p. 436] than in water after seeding. The best results were obtained with 3 c.c. dithane D14, 0·6 gm. phygon (no smut), and 0·55 or 0·65 gm. tuads (no smut). In untreated soil there was 53 per cent. smut.

E. F. Guba states that the resistance of Improved Bay State to tomato leaf mould (*Cladosporium fulvum*) [ibid., xxvii, p. 164] was confirmed by various stations. No. 44 B 292, a Prince Borghese × *Lycopersicon peruvianum* × Pan America hybrid, is being pure-lined for leaf mould resistance. In spraying tests for the control of powdery and downy mildews (*Erysiphe cichoracearum* and *Pseudoperonospora cubensis*, respectively) and black rot (*Mycosphaerella citrullina*) of Butternut squash [ibid., vii, p. 716; xxiv, p. 128] the best control was obtained after five applications with phygon (1–100) [ibid., xxvii, p. 165], although yields and average weight of fruits compared unfavourably with those on plots sprayed with fermate (1½–100), zerlate (2–100), Bordeaux (4–4–100), and tribasic copper sulphate (4–100). The sprayed plots had 3·5 to 9·1 per cent. of infected fruit, the unsprayed 18·5 and 22·7. In storage, the least loss from black rot was sustained by squash from phygon-sprayed plots immersed in phygon or in a combined phygon-wax emulsion and from zerlate-treated plots immersed in zerlate or formalin solution.

E. F. Guba reports a very serious epidemic of apple scab [*Venturia inaequalis*: ibid., xxvii, p. 425] promoted by continuous rains during the growing season. Six applications of phygon or puratized, or three of flotation sulphur paste alternating with three of puratized, gave the best control on Delicious. Phygon, puratized, and fermate gave the best control on McIntosh; flotation sulphur paste and puratized alternating also gave good results. Puratized eradicated foliage scab best. While phygon and fermate are markedly fungistatic, wettable sulphurs are not. A combination of fermate and wettable sulphur is more efficient in scab control than either alone. Phygon and fermate treatments, each combined with lead arsenate or with wettable sulphur, caused the least russeting of Delicious fruits. Phygon sprays induced abnormal foliage colour and decreased the weight of the fruit. It was observed that the addition of lime increases the loss of sulphur from weathering. Coarse sulphur weathers off more than paste or the finest particle sulphurs.

L. H. Jones and M. A. Tio found that when Havana Seed and Yellow Mammoth tobacco varieties were grown in a compost soil at 95° F. severe frenching symptoms [ibid., xxvii, p. 263] developed on both varieties in eight days, but none at 70°. Rosetting or polyphylly appeared in 21 days when terminal growth stopped. In a culture solution consisting of potassium dihydrogen phosphate, calcium nitrate, magnesium sulphate, and ferrous sulphate no frenching occurred at the high or the low temperature. Tests showed that air-drying the soil or autoclaving it for one hour at 15 lb. pressure prevented frenching. Frenched leaves contain a large amount of nitrates and less iron than normal ones; this lack apparently prevents the proper utilization of nitrates. The osmotic pressure of the cell sap of frenched leaf tissue was 14 atmospheres and nine for normal. Frenching was completely prevented by adding an iron sulphate-peat mixture to soil. A small amount of soil that had caused frenching, mixed with autoclaved soil, produced frenching at 95°, but not at 70°. It is concluded that frenching results from lack of iron and may

be prevented by addition of a ferrous humate, made by mixing ferrous sulphate and peat.

E. F. Guba cites a number of carnation varieties selected for selfing and crossing because of their resistance to *Fusarium dianthi* [ibid., xxv, p. 344]; *Verticillium* wilt (*V. cinerescens*) [ibid., xix, p. 517] and bacterial wilt (*Phytomonas* [*Pseudomonas*] *caryophylli*) [ibid., xxii, p. 360] were reported from eastern Massachusetts.

Franco (E.). **Doenças e pragas constatadas no Maranhão.** [Diseases and pests observed in Maranhão.]—*Bol. fitossan. Minist. Agric., Rio de J.*, iii, 2, pp. 91–97, 1946. [Received November, 1948.]

In the State of Maranhão, Brazil, bananas suffer from a destructive malady with symptoms resembling those of Panama disease (*Fusarium* [*oxysporum* var.] *cubense*) [cf. *R.A.M.*, xxvi, p. 333], which has, however, not been detected locally. The leaves turn yellow and hang close to the pseudo-stem, the internal tissues of which are blackened, and the fruit bunches remain abortive. Studies on this apparently new disease are in progress. *Heterosporium* [? *Helminthosporium*] *torulosum* [ibid., xvii, p. 50] and *Cordana* [*Scolecotrichum*] *musae* [ibid., xxvi, p. 334] are widespread but unimportant. *Cercospora musae* [*Mycosphaerella musicola*] has not been observed at Ilha or Rosario.

Colletotrichum gloeosporioides is prevalent on avocado and mango, the latter sustaining very heavy damage, with scarcely a sound fruit left in the rainy season; the avocado is also attacked by *Oidium* spp. Pathogens of citrus include *Phomopsis* [*Diaporthe*] *citri*, *Elsinoe fawcetti*, and the sooty mould *Limacinia penzigi* associated with a coccid. Figs are subject to infection by *Kuehneola* [*Cerotelium*] *fici*. Vines are very rarely cultivated, but downy mildew (*Plasmopara viticola*) has been observed in one or two private gardens. The entomogenous fungus *Aschersonia turbinata* [ibid., xxvi, p. 335] occurs on guava leaves infested by coccids and sooty mould. During the dry month of November tomatoes develop blossom-end rot unless irrigated twice a day. *Diplodia* [*Botryodiplodia*] *theobromae* is a source of heavy losses in young cacao fruits, whether in sunlight or shade.

Strugger (S.). **Fluorescence microscope examination of bacteria in soil.**—*Canad. J. Res.*, Sect. C, xxvi, 2, pp. 188–193, 1948.

By staining soil for five or ten minutes with the fluorescent dye acridine orange (1:1,000 to 5,000) and examining it under a fluorescence microscope, living bacteria present can be observed directly in their autochthonic condition. All humus substances are stained red, while the bacteria living on the humus particles exhibit green fluorescence and show up in striking contrast; they are vitally stained and can be used for culture experiments.

Ciferri (R.). **Una virosis del Cacao en Colombia y en la República Dominicana.** [A Cacao virosis in Colombia and in the Dominican Republic.]—*Rev. Fac. Agron. Medellín*, viii, 29–30, pp. 79–84, 1 fig., 1948.

Further information is presented on the virus disease of cacao already reported from the Dominican Republic [*R.A.M.*, ix, p. 632] and recently observed in the Cauca Valley, Colombia. Its symptomatology is difficult to describe owing to slow development and variability under different ecological conditions. In the most advanced phase the reduction in the number of leaves and the changes in their shape, dimensions, and colour, and other morphological characters, such as the formation of a rosette at the tips of the branches and particularly of the 'chupons', recall a certain stage of witches' broom [*Marasmius perniciosus*]. The leaves, even those of normal size, develop in clusters and as a rule the intervenal areas are corrugated or dented. They gradually curve and twist, remaining permanently

curled, and at the same time an irregular marginal denticulation, involving a part or the whole of the leaf, may be observed. The accompanying progressive diminution may assume an extreme form, reducing the leaf to a small, elongate-lanceolate blade. After a time a particular type of intervenal mosaic develops in the form of discoloration and yellowing of small, contiguous areas, which may either persist for varying periods or rapidly change into generalized chlorosis. The chupons of the trunk or main branches may be short and weak, with abortive leaves situated right along the chupon or in rosettes at its extremity. On the other hand, they may be relatively long and narrow, with few and small leaves. In general, such chupons shrivel within a year. In this way the canopy of the tree is progressively depleted and the density of the foliage reduced, resulting in death, which is sometimes sudden but more often lingering, beginning with the twigs and branches. The flowering of affected trees usually appears normal or even profuse, but such pods as are produced nearly always die within a fortnight of the onset of florescence, though a few may survive for two or three months. No abnormality of the root system was observed, although the number of rootlets formed in the uppermost 15 in. of soil was exceptionally small.

The diseased trees may occur in groups of two or three, but as a rule they are widely separated. The distribution of the malady is irregular and sporadic, and in an area of 20 ha. under observation since 1930 not more than 34 cases of infection have been noted, or 0·3 per cent. reckoning the local planting rate at 600 trees per ha. On an estate near Santiago which was inspected from 1926 to 1932, the number of diseased trees rose from five in the former to nine (one dead) in the latter year.

In transmission experiments in 1928 by grafting buds from diseased plants on to healthy stocks, only one out of 22 grew, and in this case the typical symptoms developed after 4½ months. The corresponding figures in the 1929 tests were four out of 31 and an incubation period of 100 to 145 days. These results are considered to confirm the view already held as to the responsibility of a virus for the cacao disease in the Dominican Republic and Colombia. It is evidently distinct from swollen shoot, the 'red mottle' and 'vein-clearing' of Trinidad [ibid., xxiii, p. 379], and a possible virosis of cacao reported by Posnette and Palma from eastern Venezuela (*Trop. Agriculture, Trin.*, xxi, pp. 130–132, 1944). The name proposed for the disease here described is 'narrow dented leaf'.

EKSTRAND (H.). **Övervintringen av höstsäd och vallväxter vintern 1946–1947.** [Overwintering of autumn cereals and forage grasses in the winter of 1946–1947.]—*Växtskyddsnotiser, Växtskyddsanst., Stockh., 1948*, 1, pp. 1–8, 1948.

This is a survey and discussion of the relative importance of severe winter weather and the fungal pathogens *Fusarium nivale* [*Calonectria nivalis*], *Typhula borealis*, and *Sclerotinia borealis* as causes of damage to autumn cereals and forage grasses in different parts of Sweden [*R.A.M.*, xxvii, p. 416]. As in former years, the influence of cold became progressively less marked towards the northern limits of cultivation, where the parasitic agents predominated in the etiology of winter killing. However, even in those localities where the effects of cold were most noticeable the extent of fungal damage was by no means insignificant.

Clover rot [*S. trifoliorum*] assumed a particularly virulent form in those districts where the cold was least intense [ibid., xxvi, p. 297].

ANDRÉN (F.). **Betningsförsök 1946–1947.** [Disinfection experiments 1946–1947.]—*Växtskyddsnotiser, Växtskyddsanst., Stockh., 1948*, 1, pp. 10–15, 1948.

A tabulated survey is given of the 1946–7 seed-grain disinfection experiments at the Stockholm Plant Protection Institute [*R.A.M.*, xxvi, p. 336]. The rye seed was

heavily contaminated (70 per cent.) by snow mould (fusariosis) [*Calonectria nivalis*], and in the spring the difference between the treated and untreated plots was very noticeable. Certosan (200 gm. per 100 kg.) gave the best control, being assessed at 1·3 in an ascending scale of infection from 1 to 10, followed by panogén at 200 ml. (2·6) and U.T. 1875 b at 200 gm. (2·8).

Lunasan (200 gm.) and panogén reduced the number of winter wheat plants infected by bunt [*Tilletia caries* and *T. foetida*] from 409·1 to 0·8 and 0·4 per sq. m., respectively, with corresponding yield increases from 2,650 to 3,480 and 3,530 kg. per ha., respectively. The other mercurials were likewise reasonably effective, with the exception of abavit B (200 gm.), while chlorocuprine at 200 gm. also gave very good control (0·8 diseased plants per sq. m.).

The incidence of stripe disease [*Helminthosporium gramineum*] in the summer barley crop was reduced from 187·5 to between 2 and 5·5 plants per sq. m. by the mercury-containing fungicides, the average efficiency of which was rated at 97 per cent. as against 32 for the three mercury-free.

The best control of loose smut of oats [*Ustilago avenae*] was given by aagrano [dosage not stated], with 0·1 infected plants per sq. m. compared with 21·2 in the untreated plots. Next in order of efficiency came betoxin 61 (200 gm.), panogén, and U.T. 1875 b (0·3, 0·4, and 0·8, respectively). Phygon and furfurol were the only non-mercurial preparations with any marked toxicity to *H. gramineum* and *U. avenae*. Used at 200 c.c. per 100 kg. they each reduced the number of striped barley plants from 82·2 to 22·8 per sq. m. The numbers of plants attacked by *U. avenae* in the plots treated with phygon (300 c.c.) and furfurol (300 c.c.) were 1·5 and 2·5 per sq. m., respectively, as against 17·5 in the controls.

Jenkins (W. A.). **A root rot disease-complex of small grains in Virginia.**—*Phytopathology*, xxxviii, 7, pp. 519–527, 3 figs., 1948.

Appreciable losses have been caused in small grain crops, including wheat, oats, and barley, in Virginia during the past six years by a root rot disease-complex, the plants affected by which are unthrifty, stunted, pale, and usually incapable of tillering. The older leaves display varying colour patterns, ranging from pale green through bronzing to lemon-yellow. Infection of young plants results in pallor and flaccidity of the leaves, many of which eventually shrivel and die. Moderately and severely diseased plants are commonly 'heaved' from the soil during periods of freezing and thawing, but they may also be uprooted before the onset of the autumn frosts or following similar conditions in the spring. Stand losses amounting to between 70 and 90 per cent. have been sustained on some experimental legume-small grain-tobacco rotation plots, but field reductions in general are considerably less.

The first indication of the complex in the root systems of diseased plants is the presence of water-soaked lesions within the cortex of the feeder roots. Rapid changes in the colour of the lesions, from pale yellow to tawny and subsequently darkening, are accompanied by a loosening of the cortex and slipping of segments of the cortical tissues in a collar- or sleeve-like manner, exposing the woody cylinder. The leaf bases and young leaves within the crown of diseased plants are also invaded and in some cases actually severed from their attachments.

The root rot complex was found to be initiated by the feeding habits of members of the meadow nematode group, *Paratylenchus* [*Anguillulina*] *pratensis*, *Panagrolaimus subelongatus*, *Paraphelenchus* [*A.*] *pseudoparietinus*, and *Ditylenchus* sp. As the soil temperatures rise, [unspecified] bacteria and fungi enter the injured tissues and extensive root-rotting ensues.

Control of the small grain root rot complex has not been effected, but soil fumigation with DDT, combined with practices contributing to the development of a vigorous root system, appears to offer some promise of success.

Simmonds (P. M.). **A note on the use of oil as a carrier for smut fungicides.**—*Sci. Agric.*, xxviii, 8, pp. 375–376, 1948.

To eliminate the dust nuisance encountered during seed treatments, the author carried out experiments in 1947 using oil as a carrier for smut fungicides. Ceresan and leytosan were found to be most satisfactory for this purpose. The proportional amount of ceresan (at the rate of $\frac{1}{2}$ oz. per bush.) was mixed in 10 c.c. light white mineral oil, and 1 c.c. aliquots of this were used per lb. lots of seed. In some cases the rate was doubled. The mixture had no detrimental effect on germination, flow was not impeded, and coverage was fairly good with very little mixing.

In field tests in which Red Bobs wheat with moderate to heavy inoculation of bunt (*Tilletia caries* and *T. foetida*) and Victory oats with covered smut (*Ustilago kolleri*) were used, the oil-fungicide treatments gave good control.

Washko (J. B.). **Small grain variety tests, Pennsylvania, 1941–47.**—*Bull. Pa St. Coll.* 501, 22 pp., 3 figs., 1948.

This report, compiled by the author from results contributed by the staff of the Pennsylvania Agricultural Experiment Station, includes descriptions and tabulated performance records of cereal varieties tested from 1941 to 1947. The following resistant varieties are mentioned. The winter barley variety Kentucky No. 1 is resistant to leaf stripe [*Helminthosporium gramineum*] but susceptible to mildew [*Erysiphe graminis*] and loose smut [*Ustilago tritici*]. Of winter wheats, Thorne carries resistance to loose smut and mosaic, Yorkwin shows some resistance to loose smut, and Nured and Fairfield are resistant, but the last-named is highly susceptible to brown foot rot and ear blight [*Gibberella zeae*]. Of the new wheat varieties which require further testing, Blackhawk and Vigo [*R.A.M.*, xxvii, p. 128] were resistant to rust [*Puccinia graminis* and *P. triticina*]. Among spring oats Clinton [ibid., xxvii, pp. 15, 182] showed resistance to *P. graminis*, crown rust [*P. coronata*], smuts [*Ustilago avenae* and *U. kolleri*], and *H. victoriae*. Ajax [ibid., xxvi, p. 385] is resistant to *P. graminis* and *Helminthosporium* blight, but is susceptible to crown rust. Cornellian and Patterson show resistance to *H. victoriae*, but the latter variety is susceptible to black and crown rusts. Vicland is resistant to crown rust, black rust, and smut, but is highly susceptible to *H. victoriae* [ibid., xxvii, p. 510].

Prasada (R.). **Discovery of the uredo-stage connected with the aecidia so commonly found on species of Berberis in the Simla hills.**—*Indian J. agric. Sci.*, xvii, 3, pp. 137–151, 4 pl., 1947.

In September, 1940, the author found that *Agropyron semicostatum* and *A. longearistatum* plants in the Simla hills, India, growing near *Berberis lycium* bushes bearing rust aecidia, were heavily infected with black rust (*Puccinia graminis*), this being a new host record for the country. The connexion between the two states has been established.

The teleutospores from *A. semicostatum* germinated between 40° and 90° F. Viability was greatly impaired after exposure to temperatures between 100° and 120° for 24 hours and no germination was obtained after 48 hours at 110° to 120°. The uredospores lost their viability after 24 hours exposure to 100° to 110°.

Inoculations with sporidia produced moderate to heavy infection on young leaves of *B. lycium*, *B. coriaria*, and *B. aristata*, light to moderate on *B. tinctoria*, and light on *B. umbellata*. Wheat, barley, oats, and rye were not infected by naturally formed aecidiospores or those resulting from the above inoculations, but the uredo stage was produced by aecidial inoculations on *A. repens*, *A. semicostatum*, and *A. longearistatum*.

Of the differential hosts of *P. graminis tritici*, *P. g. avenae*, and *P. g. secalis* and also various wild grasses inoculated with uredospores from *A. semicostatum*, only *Bromus patulus* became infected.

Cross-inoculations made with uredospores of *P. g. tritici* and *P. g. secalis* resulted in moderate infection of the three *A.* spp., while *P. g. avenae* uredospores produced weak infection.

The results indicate that the rust is a new specialized form of *P. graminis* and the name *P. graminis agropyri* (Pers.) Mehta & Prasada is suggested.

Yin (S. Y.). **Studies on physiologic specialization in Puccinia graminis tritici Erikss. & Henn. in China and varietal resistance of Wheat.**—*Acta Agric.*, i, 1, pp. 10–21, 1 map, 1947. [Chinese summary.]

This paper covers the author's studies in Kunming from 1942 to 1946 on the physiologic specialization in *Puccinia graminis*, part of these having already been recorded [*R.A.M.*, xxv, p. 157]. Inoculations of 12 standard wheat varieties with 265 rust collections from 12 Chinese provinces demonstrated, in addition to the physiologic races already noticed [loc. cit.], race 98. The most common races 15, 107, and 122 have been identified 62, 52, and 37 times, respectively, in the 265 collections. The biotypes of races 15 and 122 could be differentiated by using Percival's wheat strains 32D1 and 1H16.

Of the 1,188 wheat varieties tested consisting of 401 good, local, commercial varieties and 787 from Percival's collection, none of the former was resistant to the three common races, but 17 of the latter varieties were either immune from, or highly resistant to, the mixed races of Kunming, 7C1, 9H53, and 21H15 being highly resistant to all 15 races used.

Da Silva (S. G.). **Sôbre a resistencia de Trigo a ferrugem.** [On the resistance of Wheat to rust.]—*Bol. fitossan. Minist. Agric., Rio de J.*, iii, 2, pp. 85–86, 1946. [Received November, 1948.]

Attention is drawn to Vallega's studies on physiologic specialization in wheat brown and black rusts (*Puccinia triticina* and *P. graminis tritici*) in Brazil. A report of the work on the former species has already been noticed [*R.A.M.*, xxi, p. 133]. Investigations on the latter, published in *Ann. Inst. fitotec. S. Catalina*, iii, pp. 29–36, 1941, demonstrated the occurrence of races 15, 17, and 42 in Paraná, São Paulo, and Minas Gerais, and of the two first-named also in Rio Grande do Sul.

Ekbote (R. B.) & Kalamkar (R. J.). **Damage to the Wheat crop by rust in relation to variety and time of sowing.**—*Indian J. agric. Sci.*, xvii, 5, pp. 297–298, 1948.

After an epidemic of *Puccinia graminis* [*R.A.M.*, xxvii, p. 358] during the 1943–4 wheat-growing season an experimental planting at Government Farm, Dindori (Mandla district), was assessed to ascertain the relation between sowing date and the loss from rust calculated from the 1,000 kernel weight.

The association of highest grain weight (average 34·64 gm.) with early sowing in all the varieties surveyed indicated the least damage by rust, which increased significantly with delayed sowing (average 10·22 gm.). The varietal losses in 1,000 kernel weight between early (6th October) and late (5th November) sowing were I.P. 52 (16·2 gm.), A 115 (19·51 gm.), I.P. 101 (22·64 gm.), local variety A 090 (21·82 gm.), A 090 (20·85 gm.), A 068 (27·84 gm.), A 013 (26·16 gm.), and A 049 (27·19 gm.). From these results it appears that the extent of loss was determined chiefly by the time of sowing and the variety sown.

Informaciones de interés para los trabajos de selección de plantas resistentes a Ustilago tritici. [Notes of interest for the work of selection of plants resistant to *Ustilago tritici*.]—*Hoja inform. Minist. Agric., B. Aires*, 9, 3 pp., 1948. [Mimeographed.]

Most of the wheat varieties cultivated in Argentina are susceptible to loose smut

(*Ustilago tritici*) [*R.A.M.*, xxi, p. 184], which also attacks rye, and owing to the complexity of the recognized methods of control the sole practicable means of assuring harvests lies in the use of resistant varieties. Within the *Triticum vulgare* group immunity or high resistance was demonstrated by inoculation experiments in the case of China 466 and its descendants 38 M.A. and Sinvalocho M.A. [ibid., xxi, p. 187], as well as in some foreign varieties, e.g., Dixon, Fultz, M.A. 101, Heines Kolben, and certain lines resulting from a cross between the last-named and 38 M.A. The varieties comprising the *T. durum* group are generally resistant, especially Acme, Kubanka, and Pentad. Many varieties are resistant to loose smut, among the most interesting, by reason of their comparable reaction to other diseases as well, being Axminster, H.44, Hope, N.A. 95 Egypt, Normandie, Kanred, and Warigo.

U. tritici is widespread throughout the wheat belt, notably in the warm, humid regions of Entre Ríos, the south of Córdoba and Santa Fé, and the north of Buenos Aires, while of recent years an extension of the disease has been noted in the south-east of the last-named province.

Yin (S. Y.). **Varietal resistance of Wheat to loose smut.**—*Acta Agric.*, i, 2, pp. 133–138, 1948. [Chinese summary.]

Of 148 Chinese wheat varieties tested from 1942 to 1946 at Kunming for resistance to loose smut (*Ustilago tritici*) [*R.A.M.*, xxv, p. 390] TH (Tsing Hua) 1234, 1455, 2515, 3114, 3389, 3758, 4139, 4205, 4795, 5035, 5914, 6024, 6028, 6286, 7828, 8651, C–9H222, Grassland, 1188, 3755, 3774, C–23H23, Nanking 793, Central 45, Kaifeng 124, Ngochen and Cheta Quality showed no trace of the disease; the last nine were also resistant to flag smut [*Urocystis tritici*: ibid., xxiv, p. 407], while Cheta Quality was reported to be resistant also to bunt [*Tilletia caries* and *T. foetida*: ibid., xxv, p. 208] and stem [black] rust [*Puccinia graminis*: loc. cit.]. Races of loose smut collected from *Triticum turgidum* failed to infect common wheat and those from the latter failed to infect *T. turgidum*.

It is suggested that the tested varieties may serve as good material for future breeding work.

Hebert (T. T.), Rankin (W. H.), & Middleton (G. K.). **Interaction of nitrogen fertilization and powdery mildew of Wheat.**—Abs. in *Phytopathology*, xxxviii, 7, pp. 569–570, 1948.

The early spring nitrogen top-dressings recommended for wheat in North Carolina increase the incidence of powdery mildew [*Erysiphe graminis*], and it was therefore of interest to determine how this extension of the disease affects the yield increases obtained from the use of the fertilizer. In two experiments nitrogen was applied at different times on sandy loam plots well supplied with phosphorus, potassium, calcium, and magnesium, where mildew was controlled by dusting with sulphur and on undusted plots in a split-plot design. A highly significant interaction was obtained between the use of nitrogen soil amendments and mildew control. Dusting had very little effect on yield in the absence of nitrogen or when 45 lb. was applied at sowing time (24th October), but when the same amount was given as a top-dressing in the spring the dusted plots produced up to 40 per cent. more than the untreated. The 1st February application gave a significantly higher yield than that of 1st March in the undusted series, but fell slightly below it in the dusted. Moreover, the use of nitrogen at sowing time produced as high a yield as the March application in the undusted plots, but gave definitely inferior results in the treated series. Thus, the presence of mildew on wheat may influence both the optimum time for nitrogen applications and the response of the crop to the fertilizer.

Anderson (A. L.). **Association of Gibberella zeae and Helminthosporium sativum as related to the development of Wheat headblight.**—Abs. in *Phytopathology*, xxxviii, 7, p. 574, 1948.

Only 50 per cent. of *Helminthosporium sativum* conidia germinated, with short, knobby germ-tubes, when mixed with high concentrations of *Gibberella zeae* spores (minimum 10^6 per ml. water). Moreover, the colonies of *G. zeae* inhibited linear growth of *H. sativum* in culture. Seed infection by *H. sativum* on wheat heads at 24° to 25° C. was not prevented by an equal admixture of *G. zeae* with the inoculum, e.g., 10^5 or 10^6 spores of each pathogen, or vice versa, but when one predominated over the other, infection by the latter was suppressed. Thus, inoculum consisting of 10^6 spores of *H. sativum* and 10^5 of *G. zeae* resulted in only 8·9 per cent. seed infection by the latter as against 32·2 per cent. with 10^5 *G. zeae* alone.

Stanton (T. R.). **The present status of southern Oat improvement.**—*J. Amer. Soc. Agron.*, xl, 7, pp. 751–757, 1948.

During 1947 *Helminthosporium victoriae* developed in epidemic proportions in the oat crops of the lower southern United States, where its incidence and destructiveness will necessitate decided changes in the current breeding programme. All varieties resistant to crown rust [*Puccinia coronata*] and smuts (*Ustilago avenae* and *U. kolleri*) derived from crosses with Victoria are susceptible to *H. victoriae* [see above, p. 11]. The only two available southern varieties resistant to Victoria blight and crown rust are Camellia and Florida 167, the former originating from a cross between Bond and Alber and the latter as a selection from Fulghum × Bond. Also resistant to *H. victoriae* are the various strains of the old Red Rustproof and both the older and newer varieties of hardy common and hardy red oats grown mainly in the so-called northern common winter oat area.

Breeding for resistance to stem [black] rust [*P. graminis*] is still in progress, and new selections with resistance to this disease as well as to crown rust are becoming available for testing with a view to future distribution. Work is also being continued on the development of resistance to the oat smuts and mosaics [apical and eyespot mosaic viruses: *R.A.M.*, xxv, p. 554]. A disturbing feature of tests for mosaic resistance has been the high susceptibility of Victoria and Bond, and of selections from crosses involving them. Efforts are further being made to discover varieties with resistance to leaf and glume blotch (*H.* [*Pyrenophora*] *avenae*), which was very prevalent in the lower south in 1947.

Atkins (J. G.) & Stamper (E. R.). **Varietal reaction of Oats to Helminthosporium victoriae.**—Abs. in *Phytopathology*, xxxviii, 7, p. 568, 1948.

In field tests on the varietal reactions of oats to *Helminthosporium victoriae* in Louisiana [see preceding abstract], where the blight was first observed in 1947, causing heavy losses, Clinton and Nortex were highly resistant; Fulghum, La. 42–48, Ferguson 922, Alber, Appler, and Camellia resistant; and Traveler, Letoria, Quincy Red, and Victorgrain highly susceptible. The same general trends were followed in the greenhouse, where the following supplementary data were obtained: Benton, Hastings 100 bushel, Nortex 107, and a number of Coker's Hybrids proved highly resistant; Lee, Rustler, Ranger, and Louisiana Red Rustproof resistant; and De Sota, Fultex, Lega, Stanton, Vicland, and Fulgrain susceptible. The results of seed treatments have been unsatisfactory and excess dosages of some of the mercurials caused heavy reductions in yield. The fungus appears to develop more frequently on or within the glumes than on the seed itself.

Martyn (E. B.). **West end bud rot or the unknown disease of Coconuts.**—*J. Jamaica agric. Soc.*, lii, 4, 5, 6, pp. 88–91, 1948.

The west end bud rot or unknown disease of coco-nut palms [*R.A.M.*, xxvi,

p. 53] was first recorded in Jamaica in 1872 and was well established on the North-West coast by 1902. It has never been observed east of a line drawn from Rio Bueno to Alligator pond. In addition to Haiti [loc. cit.] and the Bahamas, it is probably the same disease which occurs in Cuba, on parts of the Caribbean Coast of Central America, and in the Cayman Islands, where it has been known for many years.

The cause of the disease is still not known. It is not due to soil deficiency; spraying with manganese had no effect and inoculation experiments with iron, boron, magnesium, and zinc, which are still in progress, have also failed to ameliorate the condition. The occurrence of the disease in many varied localities excludes the possibility of a toxic element in the soil. Its steady movement along the North-West coast to new coco-nut regions (where a few early cases are followed by wholesale killing during the wet summer and autumn) indicate an infectious nature and it is suggested that it may be caused by a virus. No insect has been found, however, that seems a likely vector and also the symptoms of the disease differ from those generally associated with viroses.

Assuming the disease to be infectious, the author recommends early cutting down and burning of infected palms, especially in areas where the disease has just appeared.

Patel (M. K.) & Kulkarni (Y. S.). **Xanthomonas malvacearum (Erw. F. Smith) Dowson on exotic Cottons in India.**—*Curr. Sci.*, xvii, 8, pp. 243–244, 1948.

Xanthomonas malvacearum [*R.A.M.*, xxi, p. 363] has now been isolated in India for the first time from leaves of exotic cotton varieties received from various parts of Bombay Province. A description of the organism and the symptoms of the disease on Indian cottons is given. Exotic cottons belonging to *Gossypium barbadense*, *G. purpurascens*, *G. hirsutum*, and *G. thurberi* are susceptible, whereas some Indian cottons of the *G. herbaceum* and *G. arboreum* groups are highly resistant. Further studies are in progress.

Dastur (R. H.) & Singh (K.). **Investigations on the red leaf disease in American Cottons. I. Red leaf disease in Sind-American Cottons in Sind.**—*Indian J. agric. Sci.*, xvii, 5, pp. 235–244, 1948.

Studies on red leaf of American upland cottons (*Gossypium hirsutum*) in the irrigated tract of Sind revealed two types of reddening depending on the physical properties of the soil, one occurring on light, sandy soil where the green colour changes through yellow to deep red or scarlet [due to nitrogen deficiency: *R.A.M.*, xxv, p. 66] and the other on clay soils, where it changes directly to red, bronze, or copper colour. Late-sown plants showed less yellow-red leaf than early-sown, and the nitrogen concentration was higher in the former than in the latter. The varieties L.S.S. and Sind Sudhar were the most severely affected and M4 the least. The more frequent and widespread occurrence of the disorder in south than in middle Sind and the Punjab, although light, sandy soils are common in all three tracts, is considered to be due to climatic conditions which hasten boll development in south Sind. The rapid maturation caused heavy depletion of nitrogen in the leaves which, as a result, turned yellow and red.

Smith (A. L.). **Soil treatment control of Fusarium wilt and nematodes of Cotton.**—Abs. in *Phytopathology*, xxxviii, 7, p. 573, 1948.

Practically complete control of cotton wilt (*Fusarium* [*vasinfectum*]) and nematodes was obtained in two years' experiments [in Georgia] with dowfume W–10 (10 per cent. ethylene bromide by volume) [cf. *R.A.M.*, xxvii, p. 305] applied at the rate of 30 to 37 gals. per acre. The acre yield of Coker 4 in 1–7 cotton was increased from 367 to 1,067 lb. and of Deltapine 14 from 64 to 904 lb. lint in a test on

Catawba fine sandy loam (deep phase) in 1947, representing increases from treatment of 191 and 1,312 per cent., respectively. In the same varieties the percentage of wilt was reduced from 52·7 to 1·8 and from 96·8 to 3·2. Coker 4 in 1–7 is on about the same level of resistance as most commercial varieties, while Deltapine is rather susceptible. A second test in 1947, using dowfume at the rate of 12½ gal. per acre in the rows, was slightly less effective against both wilt and nematodes; the highly susceptible Hurley's Rowden was not adequately protected, but Miller 610, Dixie Triumph 366, Cook 142, and Coker 4 in 1–7, with varying degrees of wilt resistance, gave yields comparable to those obtained from the heavier dosages.

Hogan (T. W.). **Pin-hole borers of fire-killed Mountain Ash. The biology of the pin-hole borer—Platypus subgranosus S.**—*J. Dep. Agric. Vict.*, xlvi, 8, pp. 373–380, 8 figs., 1948.

Cultures of *Leptographium lundbergii* [*R.A.M.*, xxv, p. 448] were obtained after specimens of the pin-hole borer (*Platypus subgranosus*) [loc. cit.] from *Eucalyptus regnans*, *E. gigantea*, *E. goniocalyx*, *E. obliqua*, and *Nothofagus cunninghamii* had been immersed in a 0·5 per cent. solution of sodium-orthophenol-phenolate and agral (1 to 1,000) for two minutes to destroy any spores carried externally. After washing in sterile water for one minute and transferring to sterile, dry sawdust for three minutes to allow recovery, the insects were finally placed on a malt agar slope and in 20 per cent. of the tests yielded *L. lundbergii*. It is concluded that the fungus is carried by the beetle, probably internally.

Baker (K. F.). **Significance of disease-free seed and propagating material.**—*Sth. Flor.*, lx, 47, pp. 13–14, 61, 62; 48, pp. 23, 57–60, 1948.

This paper, the substance of a short course given at Cornell University, is designed to show floriculturists how disease-free stock may be produced, how it should properly be used, and the benefits to be derived from its use [cf. *R.A.M.*, xxvii, p. 566]. Some methods of disease dissemination, with examples, and various methods of control for specific diseases are described, and new mechanized seedling production methods outlined. General control recommendations include the choice of stock from a known source; the production of seed or stock under healthy conditions in areas free from disease; the control of disease in seed beds by the propagator; the use of isolated parent blocks to produce stock (the segregation of market plants from propagating material is strongly advised); the regular inspection and certification of nursery stock; the elimination of seed-borne pathogens by chemical or hot-water treatment; the isolation of new stock until freedom from disease is established; and the planting of disease-free seed or stock in uninfested soil.

Garrard (E. H.). **Fasciation of Sweet Peas.**—*Canad. J. Res.*, Sect. C, xxvi, 2, pp. 158–163, 2 pl., 1948.

A strain of *Agrobacterium* [*Bacterium*] *tumefaciens* was isolated from a sweet pea plant showing fasciation [cf. *R.A.M.*, xviii, p. 159; xxv, p. 68]. A third of the crop was affected, the stems were spindly, and the leaves dwarfed, yellow, and shrivelled. A leafy, gall-like structure composed of distorted leaves and shoots was present at the crown of the original plant, and was compressed into an irregularly shaped mass, some 2·5 cm. in diameter. Germinated and non-germinated sweet pea seeds experimentally inoculated with the organism and grown in agar or sand nearly all showed fasciation, dwarfing, swollen roots and stems, and yellow, crinkled leaves; plants grown in soil were less commonly affected. The swollen parts of the stems, fasciated areas at the crown, and the roots contained characteristic bacteria. Inoculated garden pea seeds sometimes produced plants which were dwarfed. The organism resembled that isolated from fasciated sweet peas by Nellie A. Brown [ibid., vi, p. 422].

Macdonald (J. A.). **Heather rhizomorph fungus in Scotland.**—*Scot. Agric.* [formerly *Scot. J. Agric.*], xxviii, 2, pp. 99–101, 1 map, 1948.

The heather [*Calluna vulgaris*] rhizomorph fungus (*Marasmius androsaceus*) [cf. *R.A.M.*, vii, p. 291; xvii, p. 186] is stated to be widespread in Scotland. Under conditions unfavourable to the host the fungus may help to kill out large areas of heather. No other fungus except *Armillaria mellea* [loc. cit.] causes heather disease in Scotland, and this is probably absent from the greater part of all heather moors. The distribution of *M. androsaceus* in Scotland is listed and mapped. The fungus is more commonly reported as causing damage in the western than in the eastern parts of the country and it grows freely where the heather is wet underneath. In damp air the rhizomorph is tough and wiry, but when it dries it readily breaks into small parts. As it grows, it entwines the stems and pushes its way into living tissue, generally through the dead ends of small branches. Stems so attacked are killed and whole plants die out. Old plants are much more often attacked than young ones. An area burned before the war appears to be unaffected, though an adjacent unburned area is severely infected and even the current year's growth is attacked. It would appear that *M. androsaceus* will do least harm where moors are regularly burned to get rid of old infected dead stems, to encourage young heather growth, or to kill out the water-holding *Sphagnum* and prevent its reappearance.

Lightle (P. C.). **Cactus inoculating tool.**—*Phytopathology*, xxxviii, 7, pp. 578–580, 1 fig., 1948.

An inoculating tool devised in the course of investigations [in Arizona] on stem rot [*Erwinia carnegieana*] of giant cactus (*Cereus giganteus*) [*Carnegiea gigantea*: *R.A.M.*, xxi, p. 518] consists of a glazier's putty gun fitted with a piece of $\frac{1}{4}$-in. copper tubing about 12 in. long. The nozzle on the end of the gun was threaded with a pipe die and a coupling attached, so that a motor gasoline line compression fitting could be affixed to the end of the tubing to facilitate its removal for cleaning. The barrel of the gun was loaded with freshly ground diseased cactus tissue. A hole of the requisite depth was made in the plant with a $\frac{1}{4}$-in. star drill, the copper tubing inserted into the hole, and the trigger of the gun squeezed. As the tubing was withdrawn from the plant the inoculum in the barrel (about 20 c.c.) was forced out and filled the hole, which was closed with a cork. The apparatus was washed out with a 1 in 1,000 mercuric chloride solution before and after each series of inoculations.

Hawk (V. B.) & Welch (A. W.). **Tolerance of varieties of Smooth Bromegrass, Bromus inermis Leyss., to injury by root rot, Pythium graminicola Subr.**—*J. Amer. Soc. Agron.*, xl, 9, pp. 721–729, 2 graphs, 1948.

A study was made at the Iowa Agricultural Experiment Station of the relative tolerance of root rot (*Pythium graminicola*) by three smooth brome grass (*Bromus inermis*) varieties of northern and three of southern origin. The tests were carried out in the greenhouse at two soil temperatures (means of 21·3° and 27·2° C.). The mean yields (in cgm. per 4-in. pot) 28 days after planting at the higher temperature of the three northern varieties (Canadian, Manchar, and Parkland) in (*a*) uninfested soil without seed treatment, (*b*) *Pythium*-infested soil, no seed treatment, (*c*) uninfested soil, arasan-treated seed, and (*d*) infested soil, treated seed, were 81, 15, 79, and 19, respectively, and of the three southern (Lincoln, Aschenbach, and Fisher), 70, 31, 68, and 33, respectively. At the lower temperature, the yields of the northern varieties were (*a*) 80, (*b*) 27, (*c*) 69, and (*d*) 35, and of the southern (*a*) 72, (*b*) 42, (*c*) 67, and (*d*) 43, respectively. It would appear from these data that the varieties of southern origin tolerate root infection by *P. graminicola* better than the northern, and that the damage caused by the disease is less extensive at the lower temperatures. The effects of seed treatment were not significant.

Johnson (H. W.). **Some diseases of forage legumes.**—*Yearb. Agric. U.S. Dep. Agric., 1948*, pp. 267–273, 1948.

After briefly reviewing information on lucerne bacterial wilt [*Corynebacterium insidiosum*: *R.A.M.*, xxvii, pp. 24, 121] and the somewhat similar wilt of *Lespedeza* [*stipulacea* and *L. striata*: caused by *Phytomonas lespedezae*: ibid., xxvi, p. 494], the author gives short notes on the symptoms and control of southern and northern clover anthracnose (*Colletotrichum trifolii* and *Kabatiella caulivora*, respectively) [ibid., xxv, p. 455], lucerne leaf spot (*Pseudopeziza medicaginis*) [ibid., xxv, p. 215; xxvii, p. 24], the lucerne leaf spot and black stem due to *Ascochyta imperfecta* [ibid., xxv, p. 118], the leaf spot due to *Cercospora davisii* [ibid., xxiv, p. 61], red clover powdery mildew (*Erysiphe polygoni*) [ibid., xxvii, p. 567], and powdery mildew of annual *Lespedeza* (*Microsphaera diffusa*) [ibid., xxv, p. 562], lucerne rust (*Uromyces striatus*) [ibid., xxii, p. 209; xxvi, p. 110], clover rust (*U. trifolii*) [ibid., xxiii, p. 490; xxiv, p. 473], lucerne mosaic [ibid., xxi, pp. 513, 516] on lucerne and clover, lucerne dwarf [ibid., xxvii, p. 217], and witches' broom [ibid., xxvi, p. 61] and stem and root rots of forage legumes due to *Sclerotinia trifoliorum* [ibid., xxvii, pp. 283, 365], *Phytophthora cactorum* [ibid., xxii, pp. 27, 459], and other fungi.

Decker (P.). **Anthracnose of Blue Lupine is seed borne.**—Abs. in *Phytopathology*, xxxviii, 7, pp. 568–569, 1948.

In the autumn of 1943 and again in 1946, anthracnose (*Glomerella cingulata*) was reported on lupin seedlings from Florida. In the spring of 1947 it was prevalent in western Florida and southern Alabama, where it caused a substantial reduction in the seed crop [*R.A.M.*, xxvii, p. 367]. Stems, leaves, and seed pods were attacked and many seeds did not develop. Seed lots from the combine contained from 4 to 10 per cent. infected seeds after passage through the cleaner. Seed bearing acervuli covered with spores was taken from the warehouse in October and planted in the greenhouse. An average of 40 per cent. of the infected seed gave rise to seedling plants of which 75 per cent. developed normal seedlings while the remainder produced cotyledons but no true leaves. Typical anthracnose lesions appeared at or above the cotyledon attachment and on the foliage in 21 days, and soon afterwards numerous acervuli covered with spores developed in the spots. Ten chemical seed-treating preparations were ineffectual against infection through the seed in greenhouse tests.

Grandfield (C. O.), Hansing (E. D.), & Hackerott (H. L.). **Losses incurred in asexual propagation of Alfalfa clones.**—*J. Amer. Soc. Agron.*, xl, 9, pp. 716–720, 2 figs., 1948.

A tabulated account is given of investigations at the Kansas Agricultural Experiment Station to determine the responsibility of fungi for the losses, frequently running as high as 90 per cent., incurred in the process of vegetative propagation of lucerne clones. The principal organisms isolated from diseased cuttings taken from the sand bed (where they are placed for rooting) were *Ascochyta imperfecta*, the agent of black stem [*R.A.M.*, xxi, p. 528], *Rhizoctonia* spp., and *Fusarium* spp., of which the first-named was the most destructive and will no doubt prove the least amenable to control. In one experiment only 11 per cent. of the cuttings inoculated with *R.* spp. and *A. imperfecta* rooted, and 5 and 2 per cent., respectively, were healthy, compared with 84 per cent. rooted and 76 per cent. healthy in the uninoculated series. In another test the rooting percentages in the cuttings inoculated with *F.* spp., *R.* spp., and *A. imperfecta* were 90 (75 healthy), 75 (63 healthy), and 0, respectively, compared with 96 rooted, and 83 healthy in the uninoculated. Of the uninoculated cuttings planted in sand infested with *F.* spp., *R.* spp., and *A. imperfecta*, 99, 89, and 15 per cent., respectively, took root and 93, 25, and 3 per

cent., respectively, were healthy, the corresponding figures for those planted in non-infested sand being 96 and 90, respectively.

Two measures will apparently be necessary to increase the number of sound cuttings produced by vegetative propagation, viz., the sterilization both of the sandy rooting bed and the soil to which the cuttings are transplanted, and the adoption of sanitary field practices to prevent the introduction of *A. imperfecta* and other fungi on the propagating material.

Bhide (V. P.) & Uppal (B. N.). **A new Fusarium disease of Lang (Lathyrus sativus).**—*Phytopathology*, xxxviii, 7, pp. 560–567, 1948.

A destructive new wilt disease of *Lathyrus sativus*, an important cold-weather fodder crop in the Broach district of Bombay Province, was first observed in 1935–6 and has since assumed serious proportions, generally causing losses of 10 to 15 per cent., though fields with 60 to 70 per cent. infection are not uncommon in some seasons. Foliar chlorosis is the first perceptible symptom of the disease in the field. The affected plants are commonly sterile. Discoloration of the vascular system is confined to the roots. The fungus isolated on potato dextrose agar from wilted plants was identified as a new variety, *lathyri*, of *Fusarium orthoceras*, differing from the type in the production of a faint violet colour on steamed rice and in its non-pathogenicity to cabbage. The growth–temperature range of *F. orthoceras* var. *lathyri* extends from 11° to 33° C., with an optimum at about 27°, and its maximum virulence is exerted at soil temperatures between 25° and 27°.

Garcés (O. C.) & Gallego (F. L.). **Algunas enfermedades y plagas que atacan al Manzano en Antioquia.** [Some diseases and pests that attack the Apple in Antioquia.]—*Rev. Fac. Agron. Medellín*, vii, 28, pp. 443–494, 19 figs., 1 graph, 1947.

O. C. Garcés is responsible for the section of this paper (pp. 443–462) dealing with the host range, economic importance, symptomatology, etiology, environmental conditions, and control of apple scab (*Venturia inaequalis*), canker (*Physalospora obtusa*), powdery mildew (*Podosphaera leucotricha*), and bitter rot (*Glomerella cingulata*) in the Medellín district of Colombia.

Askew (H. O.) & Kidson (Elsa B.). **The control of magnesium deficiency of Apple trees in the Nelson district, New Zealand.**—*N.Z. J. Sci. Tech.*, A, xxix, 5, pp. 247–255, 3 figs., 1948.

Magnesium deficiency in Sturmer, Jonathan, and Cox's Orange apple trees has been effectively controlled for seven seasons in the Nelson district of New Zealand by one application of dolomite (6 lb. per tree) and magnesium carbonate (2 lb.) [*R.A.M.*, xxvi, pp. 230, 342]. Even better results were given by a repetition of the treatment in a second season. Magnesium sulphate proved less efficient than the other two materials. Foliar analyses showed that the state of the trees was correlated with magnesium content [see above, p. 4].

Notwithstanding the great improvement in the trees following the use of dolomite in particular, some symptoms of magnesium deficiency have generally appeared before the end of the season. However, the slight damage from this source would not have prevented the development of satisfactory crops, so that the control of the trouble, though not complete from a scientific standpoint, has been commercially adequate.

De Sonnaville (P.). **Calciumarsenaat als bestrijdingsmiddel tegen schurft.** [Calcium arsenate for the control of scab.]—*Meded. Direct. Tuinb.*, x, pp. 427–429, 1947.

The results of experiments in Holland showed that calcium arsenate [*R.A.M.*, xxi, p. 294] is distinctly fungicidal when used as a protective spray against apple

scab [*Venturia inaequalis*: see preceding abstracts]. In 1944 it was more effective than lime-sulphur, while in 1946 both fungicides gave approximately equal results.

Berkeley (G. H.) & Willison (R. S.). **Yellows and necrotic ring spot of Sour Cherries in Ontario: inoculation experiments.**—*Phytopathology*, xxxviii, 7, pp. 509–518, 2 figs., 1948.

This is an expanded account of studies on the yellows and necrotic ring spot viruses of sour cherry in Ontario, a note on which has already been published [*R.A.M.*, xxvi, p. 203]. Inoculation experiments showed that necrotic ring spot falls into two phases, one short and acute, producing the same general effects on Montmorency cherry, Elberta, Rochester, and seedling peaches, Italian prune, and Lombard plum, namely, shock symptoms followed by recovery, and the other chronic and symptomless, except for occasional mild reactions in cherry. The acute phase of cherry yellows is markedly similar to that of necrotic ring spot. The chronic phase on sour cherry is characterized by chlorosis and defoliation in early summer, and on peach and plum by symptoms simulating those of prune dwarf [ibid., xxiv, p. 196]. Necrotic ring spot is caused by a different virus from that responsible for chronic symptoms of yellows, a conclusion based on the symptom expression on Montmorency as well as the differential reaction of peach, Lombard plum, and Italian prune to the two viruses. Of the various possible explanations for the parallels and differences in the symptomatology of cherry yellows and prune dwarf, the most plausible appears to be the causation of the former disease by a complex, the components of which are the prune dwarf and necrotic ring spot viruses. Experiments designed to supply information on this aspect of the disease are in progress.

Kephart (Joyce E.) & Dunegan (J. C.). **Infection of seedling Peach stems by zoospores of Phytophthora cactorum.**—*Phytopathology*, xxxviii, 7, pp. 580–581, 1948.

As in 1935, inoculation experiments with the mycelium of *Phytophthora cactorum* on succulent peach stems did not result in the typical wilting caused by the fungus in nature [*R.A.M.*, xv, p. 34]. Field observations on the diseases in Arkansas nurseries, especially during the abnormally wet spring of 1945, suggested the involvement of water-borne zoospores in the production of infection. Zoospore formation in a culture of *P. cactorum* isolated from a peach seedling in that season was induced by Drechsler's procedure [ibid., ix, p. 611]. Natural conditions for infection were simulated by pouring soil lixiviate containing motile zoospores into water-tight cups formed by attaching small sections of plastic tubing to the stems with cellulose tape and paraffin.

In the first experiment the zoospore-containing lixiviate was poured into the cups round ten seedlings, while a further ten were similarly treated with sterile soil lixiviate. Typical symptoms, i.e., water-soaked streaks, appeared on the stems of all the inoculated plants after three days, and at the end of five the girdling canker characteristic of the disease developed. The seedlings wilted and eventually collapsed. The controls remained healthy. The seedlings were also inoculated by the transference of loops of infested soil lixiviate to the liquid in the cups. Typical symptoms developed within 48 hours, the stems were girdled with cankers at the end of five days, and after seven the seedlings were dead. The uninoculated controls again remained healthy. *P. cactorum* was re-isolated from the inoculated plants and formed zoospores in pure culture, which in their turn produced typical cankers and wilting in a third series of experiments. The chain of evidence that zoospores are capable of initiating the peach seedling stem canker has thus been completed, and the experimental results support the theory that they are responsible for field infections.

Hahn (G. G.). **Immunity of Canadian Black Currant selections from blister rust.**—*Phytopathology*, xxxviii, 6, pp. 453–456, 1948.

In 1946, three plants of each of the Canadian black currant clones No. 0–381 and 0–393 (two seedling selections from a cross between *Ribes ussuriense* and the black currant variety Kerry) were inoculated at New Haven, Connecticut, with fresh, locally collected aecidiospores of the white pine blister rust, *Cronartium ribicola* [*R.A.M.*, xxiii, p. 447; xxvi, p. 429]. Susceptible controls, including an undetermined black currant variety, the native black currant *R. americanum*, and selections of a black currant reported as having been introduced originally from Siberia by Dr. N. E. Hansen, were also inoculated, all of which became infected, the first-named so severely as to cause defoliation. No signs of rust were apparent on the Canadian plants.

In 1947 two plants of each resistant clone were transplanted to a *Ribes* plantation and inoculated with material from Maine and Connecticut under conditions highly favourable to infection, the remaining two plants were again inoculated in the greenhouse this time with aecidiospores from Virginia. The field controls were the Hansen and another black currant; the greenhouse ones being the latter and *R. glandulosum*. Very heavy rust infection occurred on the greenhouse controls while in the field infection was light to moderate. Again no rust was observed on any of the Canadian plants. They are therefore defined as being completely immune from the disease. A footnote records that the Canadian clones have remained rust-free also in Wisconsin.

In 1946 a natural infection of *Sphaerotheca mors-uvae* occurred on the new growth of the Canadian clones in the greenhouse. A slight attack also occurred in 1947.

Katznelson (H.) & Richardson (L. T.). **Rhizosphere studies and associated microbiological phenomena in relation to Strawberry root rot.**—*Sci. Agric.*, xxviii, 7, pp. 293–308, 1 pl., 1 graph, 1948.

Treatment of soil infested with strawberry root rot organisms [*R.A.M.*, xxvii, p. 571] with 2·5 per cent. dried blood, or acetic acid (added to bring the soils to 60 per cent. moisture content and pH 4 to 4·5), or by steam sterilization resulted in the reduction of the root rot rating after 220 days from 9 (on a scale from 0 to 10) in the controls to 1, 3, and 6, respectively. Oat straw appeared to increase the severity of the disease (rating 10) and caused a temporary increase in the number of soil organisms particularly at the 100 day sampling period. Healthy roots yielded none of the fungi usually associated with root rot [loc. cit.] while infected, discoloured roots yielded *Cylindrocarpon*, *Cylindrocladium*, and *Pythium* spp., an orchid strain of *Rhizoctonia*, and especially *R.* [? *Corticium*] *solani* [ibid., xxvi, p. 400]. *Asterocystis* [*Olpidium*] and a 'mycorrhizal' fungus were common in most roots [ibid., xiii, p. 785].

Correlation was established between the 'bacterial balance index' [ibid., xx, p. 541] and root rot incidence, strawberry tissue and oat straw lowering the index and dried blood raising it to the highest value.

Organisms requiring complex nutritional factors were relatively more abundant in the soil than in the rhizosphere, while bacteria with very simple nutritional needs and those requiring amino acids for growth were, on the whole, relatively more numerous in the rhizosphere than in adjacent soil.

Rhizospheres in soil treated with susceptible strawberry tissue supported a red-green *Penicillium* (26 per cent.), *Verticillium* (28 per cent.), and *Cladosporium* (4 per cent.), whereas the surrounding soil contained *Aspergillus* (6 per cent.), *Trichoderma* (12 per cent.), *Mucor-Rhizopus* forms (6 per cent.), *Oothecium* (12 per cent.), and 24 per cent. of an unidentified fungus. The different treatments altered both the numbers and kinds of fungi in each situation.

The growth of the pathogenic *Cylindrocladium* spp., *Cylindrocarpon* spp., and

Rhizoctonia strains in culture media with acetic acid was restricted or suppressed; common saprophytic fungi were much less sensitive in this respect. Acetic acid proved more toxic than hydrochloric acid in these tests.

Filtrates of *Cylindrocladium* sp. and *Fusarium* sp. caused complete wilting of strawberry seedlings within 3 or 4 days, those of *Cylindrocarpon* were less effective.

Inoculation of sterilized soil with various combinations of saprophytic and pathogenic fungi and certain groups of bacteria indicated that *C. solani* was the most serious of the pathogens used, causing root discoloration in six-week-old seedlings in four weeks; it was isolated from about 90 per cent. of the infected roots tested. *Pythium* was recovered frequently from roots; it appears to be capable of rapid penetration of strawberry roots.

Mehta (P. R.) & Bose (S. K.). **A leaf-spot disease of Fig (Ficus carica L.) caused by Cylindrocladium scoparium Morg.**—*Indian J. agric. Sci.*, xvii, 4, pp. 219–221, 1 pl., 1947.

In 1945, at Cawnpore, India, severe leaf-spotting occurred on fig trees during the rainy season and again at the beginning of July, 1946. The affected leaves bore on both surfaces minute brown spots, which enlarged into uniform or zonate, prominent, reddish-brown lesions with dark brown margins measuring 30 to 40 mm. in diameter, mostly coalescing at a later stage into irregular patches. The centres of the lesions often dropped out. A cobweb-like mycelium spread over the lower surface and subsequently appeared powdery.

Inoculation experiments with a conidial suspension resulted in 90 per cent. infection; characteristic lesions were produced within a week and fructifications after two weeks, humid conditions being essential for infection. The infected leaves are shed 20 to 30 days earlier than the healthy ones. It appears that the fungus is a weak parasite, attacking mature leaves in a low state of vitality before shedding.

The morphological characters were identical with those of *Cylindrocladium scoparium* [cf. *R.A.M.*, xxiii, p. 305], a genus not hitherto recorded in India.

Hampe (P.). **Le poudrage électrique.** [Dusts applied by electricity.]—*Rev. Vitic., Paris*, xciv, 5, pp. 145–147, 1948.

The author elucidates the physical principles involved in the electrification and deposition of dust particles [*R.A.M.*, xxvii, p. 287].

Andrade (A. C.). **Progressos no estudo dos fungicídas orgânicos.** [Progress in the study of organic fungicides.]—*Biológico*, xiv, 3, pp. 57–64, 1948.

Following a brief retrospect of the evolution of fungicides since the development of Bordeaux mixture in 1882, the writer gives the composition and outlines the functions of some modern organic plant-protectives, concluding with an account of tests at the Biological Institute, São Paulo, Brazil, on seven of these preparations. Phygon proved superior to all the others in laboratory trials, exerting a strong fungicidal action at 1 in 250,000, the corresponding figures (average for the various pathogens used) for spergon, zerlate, fermate, dithane [*R.A.M.*, xxvi, p. 346], good-rite (an organic polysulphide), and shirlan being 1 in 100,000, 1 in 50,000, 1 in 30,000, 1 in 10,000, 1 in 8,000, and 1 in 5,000, respectively.

The results of field experiments fully confirmed the foregoing data. For instance, fermate at 250 gm. in 1,000 l. water was less effective than phygon and copper-containing preparations against tomato septoriosis [*Septoria lycopersici*] and *Alternaria* [*solani*]. Dithane at 500 c.c. in 1,000 l. plus 120 gm. zinc sulphate and 60 gm. lime gave satisfactory control of potato blight [*Phytophthora infestans*] accompanied by high yields [ibid., xxvi, p. 314; xxvii, p. 254, *et passim*]. In view of its mediocre performance in the other tests, dithane must be regarded as an anti-blight specific. Phygon also proved toxic to *P. infestans* and the treated stands

produced good yields. It is, however, apt to cause severe damage to certain other plants, e.g., vine and fig, and should be used with care; the prescribed concentration of 120 gm. in 100 l. can safely be reduced to 100 gm., or even to 60 gm. with a good spreader and adhesive, without loss of efficiency.

Staniland (L. N.) & Mayor (J.). **A home-made dusting machine for ridge and rowcrop work.**—*J. Minist. Agric.*, lv, 5, pp. 203–207, 2 diags., 1948.

A full description is given of the construction of a home-made horse- or tractor-drawn duster adapted for rowcrop work on the ridge or on the flat. The machine consists of a rectangular framework measuring $8\frac{1}{2}$ by $4\frac{1}{2}$ ft., which runs on a square wheel mounted vertically at the forward end; the rear ends of the sides of the rectangle are mounted on short metal skids. On either side of the wheel is mounted a dust tray which may be raised or lowered according to whether a ridge or flat ground is being dusted. Each contains an adjustable hessian dusthopper. Two 27 in. rows are dusted at a time. A continuous line of dust is deposited by the bumping action of the wheel shaking the dust from the hoppers which are slightly longer than one side of the wheel. The quantity of dust applied per acre depends on the grade of hessian, the width to which the hopper is adjusted, the speed of the machine, and the hardness of the ground. Fine hessian gives dressings of approximately 25 lb. per acre, medium hessian 50 lb., and the coarse material heavy dressings, the medium hessian being used most frequently with horse-drawn machines. Fine hessian used with a tractor-drawn machine gives dressings equivalent to horse work with medium hessian. Finer hessians should be used for hard ground.

Buchwald (N. F.). **Plant pathology.**—*Ex* The Humanities and the Sciences in Denmark during the Second World War, pp. 584–588, 1948.

This is a brief survey of contributions to the knowledge of plant pathology made during the war of 1939 to 1945, which are listed in a bibliography of 38 titles. Some of the work referred to has been noticed in this *Review*.

Eddins (A. H.). **Preserving culture media.**—*Phytopathology*, xxxviii, 7, p. 578, 1948.

A simple method of preserving tubed agar medium in a fresh condition has been used at the Potato Investigation Laboratory, Florida Agricultural Experiment Station, during the last two years. The tubes of medium are placed in one-quart glass fruit-jars, which are then sterilized at 15 lb. pressure for 20 minutes. Once a jar has been opened the cover should not be replaced over any unused tubes of medium, since contaminants may grow through the damp cotton plugs. Potato dextrose agar and water blanks have been preserved in this manner from the desiccation and shrinkage consequent on evaporation in tubes kept on a laboratory shelf or in a refrigerator, and the method is probably applicable also to other media.

Basu (S. N.). **Fungal decomposition of Jute fibre and cellulose. Part I—A preliminary survey of commonly occurring species. Part II—The effect of some environmental factors.**—*J. Text. Inst., Manchr*, xxxix, 7, pp. T232–T237, T237–T248, 1 graph, 1948.

In further studies on the fungal deterioration of jute [cf. *R.A.M.*, xxvii, p. 378] carried out partly at the Indian Jute Mills Association Research Institute, Calcutta, and partly at the Imperial College of Science and Technology, London, an average sample of hessian cloth was tested by a technique similar to that used by Galloway for analysis of fungi isolated from cotton goods [ibid., ix, p. 784]. The organisms were grown for four weeks at 30° C. in pure culture on (1) pieces of sized and de-sized jute fabric in contact with 5 ml. distilled water; (2) pieces of ordinary filter paper half-immersed in Czapek-Dox salt solution (using neutral potassium

phosphate and without sugar), and (3) 3 per cent. maize starch paste coloured with litmus to indicate acid production. Of the 69 species tested, 33 appeared to grow strongly on filter paper as the sole source of carbon. The species which apparently attacked de-sized jute and filter paper strongly and caused a loss in cellulose weight of 50 per cent. and over were *Aspergillus terreus*, *A. fumigatus*, *A. sydowi*, *Penicillium* sp., and *Chaetomium indicum*. *A. ustus*, *Memnoniella echinata* [ibid., xxvii, p. 487], *C. globosum*, and an unidentified member of the Dematiaceae all caused a loss in weight of from 30 to 50 per cent.

As expected, the sized fabric always showed more profuse growth than the de-sized and starch was more easily attacked than pure cellulose, indicating that the sizing material contributes to mildew susceptibility. Apart from the actual loss in strength of the fibre caused by the fungi some damage may be due to the production of stains by metabolic secretions.

Quantitative studies of cellulose decomposition were made using hardened filter paper as the cellulose source and the test fungi *A. terreus*, *A. fumigatus*, *P. islandicum*, *Stachybotrys atra*, and *C. indicum* as strong cellulose-destroyers and *Paecilomyces varioti*, *Trichoderma viride*, and *Penicillium citrinum* as those which have a weak action on filter paper but grow strongly on jute. A good-quality 'white' jute was utilized.

The optimum temperatures for cellulose decomposition were for *A. terreus* and *A. fumigatus* 33·5° to 37° and 33·5°, respectively, and near 30° for *P. islandicum* and *C. indicum*. All caused appreciable cellulose loss at 37° but little at 18°. *S. atra* had its optimum near 25°, was nearly equally active at 18°, and was inhibited at 37°. The optimum pH was 5·8 or lower and cellulose decomposition fell as the pH was raised. All species, however, were quite capable of adjusting the reaction in an unbuffered medium through the production of acid or alkali.

Considerable specificities were displayed towards the form of the nitrogen source. Peptone and nitrate were assimilated most easily, asparagine was very favourable to some, and the water-soluble nitrogenous matter in jute supported excellent growth although present in inadequate amounts in the fibre.

Jute was more resistant than fine, desized cotton cambric, which showed more resistance than filter paper to decomposition by all the species except *S. atra*. The last-named attacked cotton and filter paper equally efficiently and caused 53 per cent. cellulose loss; *A. terreus* caused 35·5 per cent. loss in cotton, *P. islandicum* 29·4, *C. indicum* 24·3, and *A. fumigatus* 12·2. *S. atra* and *C. indicum* caused 27·8 and 28 per cent. loss of weight in jute fibres, respectively, while *A. terreus* and *P. islandicum*, the strongest on filter paper, were the weakest on jute. Destruction of cellulose accounted for the majority of the weight loss in jute.

Water extract of jute inhibited the growth of all species, partially in the case of most, while *A. fumigatus* was completely suppressed and showed no germination in 14 days. The resistance of jute fibre is due probably to its lignin content and perhaps to a natural antibiotic.

The growth of *A. terreus* was retarded by *P. citrinum* and *T. viride*; *A. fumigatus* and *C. indicum* were stimulated by *Paecilomyces varioti*, the former also by *Penicillium citrinum*. In combinations of the strong species, partial and complete inhibitions were observed but no stimulation. *A. fumigatus*, on the other hand, which was weaker in cellulose decomposition than either *A. terreus* or *C. indicum*, completely suppressed them both.

Benignus (P.). **Copper 8-quinolinolate industrial preservative.**—*Industr. Engng Chem.*, xl, 8, pp. 1426–1429, 1948.

The commercial manufacture and use of copper 8-quinolinolate are recent developments arising from war-time needs for a superior preservative for military fabrics. The chemical, physiological, and biological properties of the compound are

described. It combines freedom from toxicity to humans with a strong fungicidal action on textile-rotting organisms, e.g., *Chaetomium globosum* and *Myrothecium verrucaria*, the killing concentrations for which in malt agar Petri dish tests were 0·05 and 0·2 per cent. by weight, respectively. The minimum amount of the preservative required to protect 8·25 oz., de-sized cotton duck against *C. globosum*, *M. verrucaria*, and *Penicillium* sp. [cf. *R.A.M.*, xxvii, p. 487] in inoculation experiments under optimum temperature and humidity conditions was 0·1 to 0·2 per cent., the corresponding figure for *Aspergillus niger* being 0·5.

In outdoor trials at Barro Colorado Island, Canal Zone, copper 8-quinolinolate did not accelerate degradation of the fabric by ultra-violet rays during 16 weeks' exposure to sunlight, and there was no loss of tensile strength in the material kept under deep shade for 12 weeks as compared with a deterioration of 17 per cent. in the untreated samples. Moreover, after seven weeks' ground contact the tensile strength of the treated fabric was unimpaired, whereas the control had lost 52 per cent. After four weeks' soil burial there was no failure in the treated samples, and even after an extended period of 13 weeks only 31 per cent. of the initial tensile strength had been lost as against 73 and 100 per cent., respectively, in the controls. In trials covering the period from June to November, 1946, at the Firestone Rubber Company Plantation, Harbel, Liberia, where the relative humidity is ordinarily 98 to 100 per cent. for several hours of each day, the maximum loss of tensile strength in the treated fabric exposed to sunlight was 48·6 per cent., to deep shade 9·1, to intermittent sunlight 13, and on the ground under rubber trees 31·7, the corresponding figures for the controls being 68·6, 89·9, 54·9, and 100, respectively. At the end of the experiment the treated materials showed no sign of microbiological attack, whereas all the controls were heavily infected after a month.

Lederberg (J.). **Problems in microbial genetics.**—*Heredity*, ii, 2, pp. 145–198, 1948.

In this paper, addressed to geneticists interested not only in the recent advances made in microbial genetics, but also in the views of and methods used by different workers in this field, the author reviews a wide range of published and unpublished literature and discusses the present state of knowledge concerning Mendelian inheritance in fungi, modes of genetic variation, mutagenesis or the induction of mutations, mutagens, mutant characters, gene recombination in bacteria and bacteriophage, transformations, and evolution and microbial populations. The author concludes that the most important problem in microbial genetics concerns the material basis of an hereditary change. A scarcely less important line of research is gene action. The analysis of the development of new gene forms is feasible only by using selective procedures on immense populations. An eight-page bibliography is appended.

Johnson (J.). **Water-congestion in plants in relation to disease.**—*Res. Bull. Wis. agric. Exp. Sta.* 160, 35 pp., 16 figs., 1947.

A detailed account is presented of further investigations carried out in Wisconsin into the possible influence of water-congestion on the predisposition of plants to disease [*R.A.M.*, xxvi, p. 558]. Using the combination greenhouse–outdoor method [loc. cit.] it was found that the new, dry, high copper-content sprays, e.g., copper A, gave much better control of *Phytomonas* [*Pseudomonas*] *angulata* and *Phytomonas tabaci* [*Pseudomonas tabacum*: cf. ibid., xxv, p. 237] than dry Bordeaux mixture [cf. ibid., xxiv, p. 404; xxvi, pp. 233, 358; xxvii, pp. 64, 124, 200]. It was also possible by this method to subject different tobacco strains and varieties to extremely severe tests for relative resistance to these diseases without using wound inoculations.

In experiments with garden beans [*Phaseolus vulgaris*] the amount of infection

secured with the halo blight organism (*Phytomonas* [*Xanthomonas*] *phaseoli*) [ibid., xxvi, pp. 372, 476] was up to 40 infections per leaf (in one trial); no infection occurred in the absence of water congestion. Pre-exposure of the bean plants outdoors for five to ten days before inoculation increased the rate and amount of congestion and the amount of infection. On the whole, the white-seeded varieties were the most resistant, especially Great Northern and White Marrow, while the pink- and black-seeded, especially Bountiful, Green Refugee, and Black Wax, were more susceptible. The degree of susceptibility was not necessarily in proportion to the amount of water congestion in any single variety.

In tests with cabbage black rot organism (*Pseudomonas campestre*) [*X. campestris*: ibid., xxvii, p. 175], the plants did not congest readily, the waxy cuticle being refractory to surface water and penetration; infections developed round the hydathodes and on the margins. The Early Jersey Wakefield variety was rather more susceptible to *X. campestris* than Little Dutch. Good infection was secured with *Erwinia tracheiphila* [loc. cit.] on the leaf margins of cucumbers without wounding.

The degree of water congestion and the amount of infection by fungal pathogens were not always closely related, suggesting that the response of stomatal openings and the condition of the waxy cuticle influenced the amount of penetration on congested leaf areas. Occasionally resistant varieties developed more congestion and infection than susceptible ones.

Both water-congested and uncongested leaves were lightly sprayed with a virus extract without resultant infection unless leaf-surface wounds were present. Part of the virus inoculum apparently enters the intercellular spaces of a congested leaf through open stomata by capillary action, but does not pass into the cells from the intercellular spaces of water-congested tissue. This indicates that even minute ruptures are not developed in the cell walls surrounding intercellular spaces as a result of temporary water congestion. Thus parasites which invade the intercellular spaces of water-congested tissues are confined to these spaces unless they can penetrate cell walls. That leaves water-congested for 48 hours may recover without any sign of injury is also good evidence that internal rupturing of tissue is not normally associated with congestion.

Several types of pathologic symptoms appeared to result from natural water congestion. Excessive water retained in leaf areas for a sufficient period (over 48 hours) to asphyxiate the cellular tissue usually caused necrosis. Thus, the leaf spots following 'potash starvation' in tobacco and other plants [cf. ibid., xvi, p. 781, xxii, p. 247, *et passim*] may be due partly to long continued water congestion, potassium deficiency in the leaf favouring the accumulation of congestive water. Other obscure leaf spots and blights also follow water congestion in the absence of parasitic infection [ibid., xxiii, pp. 270, 479].

Methods of determining the amount of water congestion are given. Trials with various crop and ornamental plants showed that they may be arranged in four groups according to whether they are highly, moderately, slightly, or non-susceptible to water congestion. Carrot, celery, and parsnip are placed in the last group.

The occurrence of water congestion under natural conditions and its bearing on epidemiology are discussed, and the paper concludes with a review of the practical importance of the investigation to the question of disease control.

Wang (F. H.). **The effects of clavacin upon root growth.**—*Bot. Bull. Acad. sinica*, ii, 4, pp. 265–269, 6 figs., 1948.

Clavacin [patulin], an antibiotic substance from *Aspergillus clavatus* [*R.A.M.*, xxvii, p. 488], was shown by experiments to be highly toxic to plant cells at concentrations upwards of 1 in 200,000. It inhibits the growth of maize roots in four hours

at a dilution as low as 1 in 1,000,000. The damage takes the form of dead cells in the root cap and epidermis and vacuolation of the other tissues.

Antibiotic activity of growth-factor analogues.—*Nature, Lond.*, cxlii, 4114, pp. 356–359, 1948.

In this article, which is based on a discussion (to which Sir Paul Fildes, Dr. D. D. Woods, Dr. H. McIlwain, Dr. T. S. Work, Dr. H. M. Rydon, Dr. F. L. Rose, Dr. J. Walker, Dr. A. Albert, and Professor M. Stacey contributed) held at the Royal Society, [London], on 17th June, 1948, certain aspects of the importance of various 'growth factors' in the synthetic activities of micro-organisms are reviewed. The fact that analogous compounds show 'substrate competition', that is, they compete in metabolism with substances of the growth-factor type, has suggested that they might be used to prevent or slow down the growth of bacteria by competing with their metabolites. Several hundred analogues of compounds known to be of importance in the cell have been synthesized and many of them possess the predicted bacteriostatic property *in vitro*. Of these only certain analogues of pantothenic acid retain their bacteriostatic power *in vivo* and also fulfil other chemotherapeutic requirements.

It is emphasized that a more exact analysis of the effects produced by the antagonism is desirable before the development of more efficient inhibitors can proceed logically. It is also necessary that the compounds should be able to interfere with cell reactions which are specific to the parasite. The suggestion is made that such species-specific reactions may be found in protein synthesis and it is noteworthy in this connexion that several naturally occurring antibiotics are peptides. Thus the tripeptide lycomarasmin (the toxic principle of *Fusarium* [*bulbigenum* var.] *lycopersici* [*R.A.M.*, xxvi, p. 361] causing tomato wilt) is toxic towards *Lactobacillus casei* and is in its turn annulled by the peptide streptogenin, a growth factor present in a number of organisms. A compound analogous to lycomarasmin has been synthesized and shows some antagonism to it. There is some evidence, too, that streptomycin is an analogue of an essential cell metabolite.

The lines are indicated along which future research should be directed to produce compounds which may be more efficient chemo-therapeutants.

Roberg (M.). **Über die Lebensdauer von Aspergillus-Kulturen.** [On the longevity of *Aspergillus* cultures.]—*Arch. Mikrobiol.*, xiv, 1, pp. 1–11, 1948.

The longevity of 10- to 15-year-old desiccated cultures of 14 species of *Aspergillus* [cf. *R.A.M.*, xxvi, p. 461], representing a total of 24 races, was investigated. Subculturing was successful in all but three species. The several races of a single species frequently differed in respect of longevity, which appears to be primarily an hereditary character. The maximum duration of life of many species was longer than generally accepted. Twelve-year-old cultures of *Penicillium brevicaule*, *P. luteum*, and *P. camemberti* were no longer viable.

Machacek (J. E.). **Some causes of waste in Manitoba table-stock Potatoes.**—*Sci. Agric.*, xxviii, 8, pp. 333–339, 1 pl., 1948.

The results of a survey of table-stock potatoes on sale in Manitoba, Canada, carried out during three consecutive winter seasons from 1944 to 1947 indicated that on an average 3·2, 6·8, and 5·8 per cent. of the tubers, respectively, in the three seasons were damaged by ring rot [*Corynebacterium sepedonicum*: *R.A.M.*, xxvi, pp. 8, 188] and 2·8, 0·6, and 0 per cent., respectively, by blight [*Phytophthora infestans*: ibid., xxvii, p. 194]. These defects, mechanical injuries, hollow heart, stem-end and vascular browning, and bacterial and fungal soft rots [unspecified] were some of the chief defects. Infection in individual samples ranged up to 37·8 per cent. for

late blight, and up to 27·6 per cent. for ring rot, the total waste from these diseases and other injuries averaging 7·7 per cent. and ranging from 0 to nearly 40 per cent.

Cox (C. E.). **Natural infection of Solanum dulcamara by Phytophthora infestans.**—Abs. in *Phytopathology*, xxxviii, 7, p. 575, 1948.

Spontaneous infection by *Phytophthora infestans* was observed on 10th July, 1947, on a *Solanum dulcamara* plant [*R.A.M.*, xxiv, p. 285] growing on a fence round a garden in Maryland where tomatoes and potatoes were also attacked. The pathogen was sporulating in foliar lesions on all three hosts, though less freely on *S. dulcamara* than on the other two. The inoculation of detached, healthy leaves in the laboratory with the apparently identical sporangia from each of the three hosts resulted in the infection of tomato, *S. dulcamara*, *Petunia*, and chilli, but not of *S. carolinense* or tobacco. The appearance of the lesions and the extent of sporulation on the inoculated leaves were the same irrespective of the source of inoculum. It is concluded, therefore, that the same fungus is the agent of infection on the three plants, and that *S. dulcamara* may serve as an overwintering host of *P. infestans* in the State.

Köhler (E.). **Über die Vermehrungs- und Ausbreitungsgeschwindigkeit des X-Virus im Blattparenchym.** [On the rate of multiplication and dispersal of the X-virus in the leaf parenchyma.]—*Z. Naturf.*, iib, 1–2, pp. 29–34, 3 graphs, 1947.

The rate of dispersal of potato virus X (strain Us/*r*) in the leaf parenchyma of susceptible hosts was determined by comparative measurements of circular infection foci of different ages. The values thus ascertained were approximately 0·3 and 0·1 mm. per 24 hours in the Samsun and Xanthia tobacco varieties, respectively, and 0·1 mm. in *Datura stramonium*. In the areas of the parenchyma bordering on the veins the rate of dispersal is much more rapid, involving marked departures from the circular form.

It was further shown that, under certain conditions, the multiplication (increase of concentration) of the virus in the inoculated leaf can be equated with a continuously expanding circular area, and that its dispersal in the latent infection foci of *Atropa belladonna* [cf. *R.A.M.*, xxvii, p. 263] takes place at the same rate as in Samsun tobacco.

The mechanism of dispersal of potato virus X in the parenchyma is outlined, but this problem demands further elucidation and experimental study.

Cunningham (H. S.). **Leaf roll in relation to second crop seed Potato production on Long Island.**—*Bull. N.Y. St. agric. Exp. Sta.* 731, 13 pp., 2 figs., 1948.

From 1942 to 1945 an attempt was made to produce disease-free second-crop seed potatoes (Irish Cobbler) on Long Island. The leaf roll [virus] content of such potatoes is normally high (70 per cent. in some cases while 30 to 40 per cent. is not uncommon), due to the use of inferior seed stocks, the presence of infected volunteer plants in the field, and the difficulty of isolating seed plots. Although the production of disease-free tubers is hampered by the isolation problem, reasonably disease-free seed can be obtained by using clean seed, planting on land which has not produced a potato crop earlier in the season, and by reasonable aphid control. Little difference was observed between the yield or leaf roll content of northern-grown seed and Long Island second-crop seed.

Andersen (A. L.), Henry (B. W.), & Morgan (T. L.). **The effect of temperature and relative humidity upon the viability of the conidia of Piricularia oryzae.**—Abs. in *Phytopathology*, xxxviii, 7, p. 574, 1948.

In storage experiments in which the relative humidities were regulated with

sulphuric acid solutions, some 75 per cent. of the conidia of *Piricularia oryzae* [*R.A.M.*, xxvii, p. 494] were viable after a year at 8° C. and 20 per cent. relative humidity. At higher humidity levels (45, 70, and 95 per cent.) the loss in viability was rapid at all temperatures. For instance, after five months' storage, viable conidia were present only in those samples maintained at 8° (all relative humidities) and at 20 per cent. relative humidity at the other temperatures (20°, 28°, and 32°). The number of lesions produced per plant by conidia stored for five months varied inversely with the temperature and relative humidity during this period. It was found that the percentage germination of the conidia did not afford a reliable basis for the prediction of infectivity, since conidia stored at 8° and 95 per cent. relative humidity and retaining 50 per cent. viable cells were unable to cause appreciable infection.

Bouriquet (G.). **Présence à Madagascar d'un nouveau parasite du Riz : le Sclerotium oryzae Catt.** [The presence in Madagascar of a new parasite of Rice: *Sclerotium oryzae* Catt.]—*Rev. Mycologie, Suppl. colon.*, xiii, 1, pp. 29–32, 1948.

In January, 1948, rice growing in the vicinity of Lake Alaotra, Madagascar, was found to be infected by *Sclerotium oryzae* [*R.A.M.*, xv, p. 313; xxiv, p. 247; xxvi, p. 415]. On potato glucose agar at 27° C. after two weeks the surface of the medium was covered with sclerotia measuring 200 to 500 μ in diameter; on the host, the figure was 200 to 300 μ.

Rice in Madagascar has hitherto been remarkably free from fungal disease. Rice stubble, however, kept wet for the cultivation of *Volvaria volvacea* frequently produces sclerotia apparently belonging to *S. rolfsii*.

For the control of sclerotial diseases of rice improved methods of cultivation are recommended. In severely affected plantings the stubble should be burnt after harvesting, the planting then being kept damp enough to favour the destruction of remaining sclerotia by other micro-organisms. Rotation and green manuring may help to discourage spread. In the Philippine Islands the Ramai variety is said to be resistant. Efforts should be made to prevent water from affected areas from reaching healthy rice.

Tai (F. L.) & Siang (W. N.). **'I-chu-hsiang' disease of Rice caused by Ephelis oryzae Sydow in Yunnan.**—*Acta Agric.*, i, 2, pp. 125–131, 1 pl., 1948. [Chinese summary.]

A disease of rice caused by *Ephelis oryzae* occurring sporadically in Yunnan and known there as 'I-chu-hsiang' (incense rod) was first noticed in 1939. It has been reported previously only from India [*R.A.M.*, xxvii, p. 379]. It occurs commonly in low, damp fields in districts bordering the Kunming Lake (Kunming, Kunyang, and Tsinning), the diseased heads showing 5 to 30 per cent. infection. The pathogen has also been found on *Echinochloa crus-galli* in rice fields at Kunming.

The affected plants are stunted, the spikelets while still inside the sheath are matted together by the mycelium of the fungus and at heading appear as a greenish, cylindrical rod. Usually all tillers of a plant are infected, which indicates the systemic character of the disease. The black, cupulate or convex, roundish sporodochia measure 1 to 1·5 mm. in diameter. On the upper surface is a layer of hyaline, acicular, aseptate, straight or curved spores, 12 to 22 (to 40) by 1·2 to 1·5 μ borne on the tips of branched, hyaline conidiophores 57 to 85 by 0·8 to 1·4 μ. The perfect state (*Balansia oryzae*) has not been found. The fungus grows slowly in culture but when incubated at 26° C., growth starts within 10 days, abundant sporulation following. The spores germinated readily between 18° and 30°, 26° being the optimum. The spores are highly resistant to drying, one third of air-dried spores

being still viable after 162 days. Spores on infected rice heads collected in October germinated in the following March. Thus it appears that the spores on the infected kernels are able to overwinter. All inoculation experiments have failed so far.

It is suggested that the pathogen overwinters in the roots of diseased rice plants left over in the fields as well as on infected kernels and initiates infection next spring through the root system of the host.

VOLLEMA (J. S.). **Tapsysteem en bruine binnenbast bij geselecterd Heveaplantmateriaal met hoog productievermogen.** [Tapping system and brown bast in selected *Hevea* planting material of high productive capacity.]—*Bergcultures*, lxx, 2, pp. 33, 35, 1948.

The results of experiments initiated at the West Java Experiment Station in 1929 to 1930 indicated that an intensive (100 per cent.) tapping system tends to promote brown bast development in certain newly selected clones and seedling families recommended for commercial plantings, e.g., Tjir 1, Tjir 16, AV 352, GT1, WR101, Pat 190, and War 4 [*R.A.M.*, xxiii, p. 290; cf. ibid., xxv, p. 183]. In such cases more conservative (67 per cent.) methods should be practised, involving half the circumference every third day, a third on alternate days, and similar periodical adjustments, while small-scale trials might also be carried out with the spiral system, allowing a resting time half as long as the tapping period. Supervisors should be trained to recognize the incipient symptoms of the disease, including a sudden excessive flow of thin latex and protracted dripping from the trees, accompanied by a brownish-grey discoloration of the most productive soft bast bordering on the cambium. The progressive depletion of the latex culminates in complete desiccation and the appearance of brown stripes and spots in the diseased bast. In some trees, the discontinuance of tapping leads to the formation in the affected areas of woody knobs, which may unite with the central xylem mass and cause severe deformation of the tapping surface.

In order to obviate certain practical difficulties arising from the early cessation of tapping, the author recommends continuance of the operations, using shortened cuts on affected trees, e.g., from half or a third to a third or a quarter of the circumference. Where the number of trees susceptible to brown bast in a commercial planting exceeds some 10 per cent., it is advisable to introduce this method throughout.

WILSON (J. K.) & CHOUDHRI (R. S.). **The effect of benzene hexachloride on soil organisms.**—*J. agric. Res.*, lxxvii, 1, pp. 25–32, 1948.

In tests at Cornell Agricultural Experiment Station the total fungal population was found to be affected little, if at all, by the application to the soil of excess amounts of crude benzene hexachloride [cf. *R.A.M.*, xxvii, p. 331]. Neither was any significant toxic effect observed after adding the crude compound to pure cultures of *Aspergillus niger*, *A. oryzae*, *Penicillium expansum*, and *P. italicum*. No toxicity to various soil organisms, including *A. niger*, *Actinomyces scabies*, *A. nocardia*, and *Rhizoctonia* [*Corticium*] *solani*, was observed at the end of 14 days in cases where the pure α, β, and ϵ isomers were used, but the δ isomer and heptachlorocyclohexane were highly toxic to *A. bovis* and *C. solani*.

ASTHANA (R. P.). **The role of 'cuttings' in the dissemination of foot-rot of Piper betel.**—*Indian J. agric. Sci.*, xvii, 4, pp. 223–225, 1947.

Piper betle cuttings from a garden infected with *Phytophthora parasitica* var. *piperina* [*R.A.M.*, xiv, p. 717; xxiv, p. 34] when planted on land not previously used for *P. betle* developed leaf rot first, but no foot rot until several months later.

In a replanted garden both rots developed almost simultaneously. It is concluded that in the first case primary infection was solely from the cuttings whereas in the second it was from infected soil as well.

Experimental evidence showed that the first four cuttings 12 to 15 in. long, consisting of five or six internodes taken from the apex downwards, carry the pathogen externally only, while in the lower parts of the stem it is carried both externally and internally. The spread of the disease to new gardens can be effectively controlled by dipping the top four cuttings in 2–2–50 Bordeaux mixture for one hour before planting. Sixty cuttings so treated did not develop the disease. Cuttings should not be taken below five feet from the top of a vine.

Steyaert (R. L.). **Contribution a l'étude des parasites des végétaux du Congo belge.** [A contribution to the study of the plant parasites of the Belgian Congo.]—*Bull. Soc. Bot. Belg.*, lxxx, 1–2, pp. 11–58, 6 pl., 1948.

Notes are given on a large number of fungi parasitic on various hosts in the Belgian Congo [cf. *R.A.M.*, xxvii, p. 463], of which 48 are new records for that area (including four that are new to Africa) while seven are new species. Records of virus and bacterial disease are also given.

Mention may be made of *Entomophthora pyralidarum* [*R.A.M.*, xvii, p. 240] on *Dysdercus superstitiosus*, *Sclerospora sorghi* [ibid., xxiv, p. 443] on *Sorghum arundinaceum*, *Nematospora phaseoli* [ibid., xxiii, p. 207] on *Soja* [*Glycine*] *hispida*, *Spermophthora gossypii* [ibid., xviii, p. 308, 309] found once only in a boll of *Gossypium hirsutum*, *Alternaria macrospora*, *Asochyta gossypii* [cf. ibid., xxvii, p. 474], *Macrophomina phaseoli*, *Fusarium vasinfectum* f. 1, *Phyllosticta gossypina* [ibid., xiii, p. 804], and *Myrothecium roridum* [ibid., xxv, p. 345] also on cotton, *Parodiella gloeosporidia* n.sp. and *Cercospora elaedis* n.sp. on oil palm, *Calostilbe striispora* [ibid., viii, p. 69; xxi, p. 281] (first record outside Central America), *Sphaerostilbe repens*, and *Cercospora musae* [*Mycosphaerella musicola*] on banana, *Fomes noxius* on *Celtis* sp., *Armillaria mellea* causing collar crack of cacao, also on oil palm and cotton, *Microdiplodia agaves* [ibid., xii, p. 395] on sisal, *Phyllosticta heveae* [ibid., xviii, p. 579] and *P. ramicola* [ibid., v, p. 323] on *Hevea* rubber, *P. zeae* on maize, *Colletotrichum theobromicola* [ibid., i, pp. 5, 206] on cacao pods, *Sphaceloma fawcetti* [*Elsinoe fawcetti*] on Seville orange, *Alternaria brassicae* var. *dauci* [*A. dauci*: ibid., xvi, p. 405] on carrot (sometimes causing considerable damage), *Cercospora cinchonae* [ibid., xxiii, p. 410] on *Cinchona ledgeriana*, *Cercospora nicotianae* on tobacco, *Leptosphaeria canephorae* n.sp. and associated with it *Helminthosporium canephorae* n.sp., *L. coffeicola*, and *Oospora meliolae* on *Hemileia vastatrix*, all on *Coffea canephora*, *Macrosporium coffeanum* on *C. arabica*, *Fusarium xylarioides* n.sp. on *C. excelsa*, *F. oxysporum* f. 1 on potato, *Microcera coccophila* and *Tetracrium rectisporum*, both on *Lepidosaphes beckii*, the first-named on lemon and orange and the second on *Citrus* spp., *A. solani* [ibid., xxv, p. 96; xxvi, p. 466] on tomato and potato, *Piricularia oryzae* [ibid., xxiv, p. 128] on *Oryza montana*, and tobacco ring spot virus on tobacco [ibid., xxvii, p. 128].

Leptosphaeria canephorae n.sp. is described as having ascospores measuring 25 to 34 by 5 to 7·5 μ as against 12 to 14 by 3·5 μ for *L. coffeigena* and 16 to 20 by 3 to 4 μ for *L. coffeicola*.

The sclerotia of *Macrophomina phaseoli* from *Gossypium hirsutum* measured about 100 by 100 μ, and belonged to type C sensu Haigh [ibid., xxvii, p. 552]; spores were not observed.

Cercospora elaedis n.sp. causing leaf spot of oil palm had dark brown conidiophores measuring 185 to 250 by 5 to 7 μ and acicular-obclavate, yellowish-brown spores which gradually became hyaline; 6- to 9-septate, they measured 125 to 187 μ long, were 6 to 10 μ broad at the base, and 4 to 5 μ two-thirds of the way from the apex; the extremities were frequently falcate at the apex.

Chowdhury (S.). **Some fungi from Assam, II.**—*Indian J. agric. Sci.*, xvi, 6, pp. 520–527, 1946. [Received October, 1948.]

Included in this second contribution to the critical study of Assam fungi [*R.A.M.*, xxiv, p. 340] are *Cercospora jujubae* n.sp. on *Zizyphus jujuba* leaves, characterized by fasciculate, fuscous, uni- to quadriseptate, geniculate conidiophores, 48 to 152 by 4 to 7 μ, and clavate, solitary, apical, straight or very slightly curved, pale olive-grey, uni- to quinqueseptate conidia, 25 to 45 by 8 to 10 μ, with a distinct basal hilum; *C. musarum* Zimm. [? *C. musae* Zimm. = *Mycosphaerella musicola*] on banana leaves; and *Helminthosporium torulosum* on the foliage and fruits of the same host [ibid., xiii, pp. 455, 787, *et passim*].

Tai (F. L.). **A new species of Coleopuccinia with remarks on the genus.**—*Acta Agric.*, i, 2, pp. 97–103, 2 pl., 1948.

Coleopuccinia kunmingensis n.sp., collected in 1939 on *Cotoneaster franchetii* and subsequently on *C. microphylla* at Kunming, Yunnan, China, differs from *Coleopuccinia sinensis* in its unicellular and somewhat narrow teleutospores, measuring 44 to 83 by 8·6 to 13 μ. The teleutospores of *C. simplex* [*R.A.M.*, xv, p. 57] on loquat, like those of *C. kunmingensis*, are unicellular and pedicellate, but in the former species they are always detached from the pedicels, which are persistent in the latter.

No material of the type species *C. sinensis* was available to the writer for comparative examination, but it seems clear from a study of the relevant literature that an emendation of the genus is essential. Hara's genus *Coleopucciniella*, described in 'Parasitic fungi of Japan', p. 262, 1936, based solely on the number of cells in a teleutospore, would appear to be untenable.

Jackson (H. S.). **Studies of Canadian Thelephoraceae. II. Some new species of Corticium.**—*Canad. J. Res.*, Sect. C, xxvi, 2, pp. 143–157, 10 figs., 1948.

Nine new species of *Corticium*, found in Ontario in the course of a general taxonomic study of resupinate Thelephoraceae are described and figured, together with a re-description of a recently described European species found to be common in Ontario.

The genus *Corticium* as usually delimited includes many simple resupinate species with no special inclusions except gloeocystidia or cystidioles and usually having colourless spores. Most European workers have segregated those possessing gloeocystidia into *Gloeocystidium* H. & L. American workers, on the other hand, include them in *Corticium*, on the ground that segregation on the basis of a single character is undesirable, and also *Gloeocystidium* H. & L. is an untenable name antedated by *Gloeocystidium* Karst. Since *Corticium* is a collective genus of unrelated groups of species it seems best to retain the gloeocystidiate forms therein until their relationships are better understood. Recent segregates from *Corticium*, which appear to be acceptable, include *Ceratobasidium* Rogers, the related genus *Pellicularia* Cooke (*Botryobasidium* Donk) [*R.A.M.*, xxiii, p. 315], and *Trechispora* Karst. as revised and reviewed by Rogers [*Mycologia*, xxxvi, pp. 70–103, 1944]. However, although the writer fully sympathizes with the need for revision, he considers it undesirable to assign described species to available genera until such genera are covered by a monographic or at least a synoptical treatment.

Ramakrishnan (T. S.) & Ramakrishnan (K.). **Additions to fungi of Madras, V.**—*Proc. Ind. Acad. Sci.*, Sect. B, xxviii, 2, pp. 56–70, 8 figs., 2 pl., 1948.

This annotated list of additional fungi of Madras [*R.A.M.*, xxvi, p. 565], eight of which are new species, includes *Puccinia coronata* found in September 1947 at Ootacamund on the stems and leaves of *Avenastrum asperum*, a new host for this rust. Both uredia and telia were present.

Niethammer (Anneliese). **Zur Systematik der Pilzgruppe Penicillium Link. I. Mitteilung: Die Untersektion Radiata (in der Sektion Velutina der Asymmetrica).** [Contribution to the systematics of the fungus group *Penicillium* Link. Note I: the subsection *Radiata* (in the section *Velutina* of the *Asymmetrica*).]—*Arch. Mikrobiol.*, xiv, 1, pp. 46–62, 6 figs., 1948.

This is a survey and discussion of the natural distribution and associations in floral nectar and soil samples of the subsection *Radiata* (section *Velutina* of the *Asymmetrica*) of the genus *Penicillium*. The macro- and microscopic characters on standard media of the species included in the subsection are described and tabulated in the form of a key. On this basis the subsection falls into four series, namely, *Typica*, represented by *P. chrysogenum* and *P. notatum*; *Baculata* by *P. baculatum*, *P. brunneo-rubrum*, *P. cyaneo-fulvum*, *P. griseo-roseum*, and *P. citreo-roseum*; *Elliptica* by *P. chlorophaeum* and *P. virescens*; and *Maxima* by *P. meleagrinum*.

Cunningham (G. H.). **New Zealand Polyporaceae. 1. The genus Poria.**—*Bull. Dep. sci. industr. Res. N.Z.* 72, 43 pp., 7 pl., 37 figs., 1947.

In this first bulletin of a series classifying the Polyporaceae of New Zealand, the author describes his technique and the morphological features of the group [*R.A.M.*, xxvi, p. 566 and next abstracts]. The type locality, distribution, habitat, and descriptions of 34 species of *Poria* (including two new combinations and ten new species) are given. He has substantiated the findings of Corner and gives a detailed grouping of the hyphal series and types which form the hymenophore of *Poria* and its relatives. The genus is divided into two sections according to whether the hyphal system is monomitic or dimitic [loc. cit.]. A key to the species and a host-species index are provided.

Cunningham (G. H.). **New Zealand Polyporaceae. 2. The genus Fuscoporia.**—*Bull. Dep. sci. industr. Res. N.Z.* 73, 14 pp., 1 pl., 10 figs., 1948.

The type locality, distribution, habitat, and descriptions of ten species of *Fuscoporia*, including eight new combinations and one new species, are given. In this genus the author includes resupinate polypores [see preceding abstract] with brown hyphae. A key to the species and a host-species index are provided.

Cunningham (G. H.). **New Zealand Polyporaceae. 3. The genus Polyporus.**—*Bull. Dep. sci. industr. Res. N.Z.* 74, 39 pp., 7 pl., 1948.

Under the tribe Polyporeae [see preceding and next abstracts] it is proposed to group all pileate species having hyphae with walls appearing hyaline under the microscope into the three genera *Polyporus* (dealt with in this bulletin), *Coriolus*, and *Fomitopsis*. A key is provided for the identification of the 36 known and two new species of *Polyporus* described together with their type locality, distribution, and habitat. They are grouped in two sections according to whether the hyphal system is monomitic or dimitic. A combined host and fungus index appears at the end of the bulletin.

Cunningham (G. H.). **New Zealand Polyporaceae. 4. The genus Coriolus.** –*Bull. Dep. sci. industr. Res. N.Z.* 75, 10 pp., 2 pl., 1948.

The species described in this fourth paper on New Zealand Polyporaceae [see preceding and next abstracts] form a natural group with certain well-defined features in common. All possess hyaline hyphae and a trimitic system with long, unbranched, aseptate, skeletal hyphae, *Bovista* type aseptate binding hyphae, and thin-walled, branched and septate generative hyphae (in which clamp-connexions

are abundant). In literature the species are placed indiscriminately under *Polyporus*, *Polystictus*, and *Trametes*. The six species described, together with their type locality, distribution, and habitat, include two new combinations. *Coriolus* (= *Polystictus*) *versicolor* [*R.A.M.*, xxvi, p. 230] is an active parasite, attacking branches through accidental wounds or during pruning operations. In cherry, peach, plum, and apple trees it induces leaf symptoms not unlike those caused by *Stereum purpureum* and produces a white rot which eventually kills the tree. A key to the species and a host–fungus index are supplied.

CUNNINGHAM (G. H.). **New Zealand Polyporaceae. 5. The genus Fomitopsis.**—*Bull. Dep. sci. industr. Res. N.Z.* 76, 8 pp., 3 pl., 1948.

Karsten's genus has been revived and emended to contain five perennial 'white' species of polypores [see preceding abstracts] (including four formerly placed in *Fomes*) which possess a dimitic hyphal system, context of hyaline, long-type hyphae, and are without clamp-connexions. Details of the micro- and macroscopic characters of each species, together with the type locality, distribution, and habitat, are given and a key to the species and a host–species index provided. *Fomitopsis annosa* (= *Fomes annosus*) [*R.A.M.*, xxvii, pp. 105, 397], which is associated with a white spongy rot, grows on bark or decorticated wood and is included as a perennial since growth layers are produced in older plants, each receding and leaving part of the previous layer exposed. The microstructure is that of a typical species of *Fomitopsis*.

Proceedings of the Sixth Annual Conference of the Indian Tea Association, Tocklai.—51 pp., 1948.

On behalf of the Jainti-Sankos sub-district, M. H. BURTON reported that blister blight of tea [*Exobasidium vexans*: *R.A.M.*, xxvii, p. 389] is more common on light than on dark leaf jats in that area, and he had been asked to have this investigated.

A. C. TUNSTALL recommended that the disease should be tackled in the jungle. Centres of infection there, such as stray tea bushes growing in the shade, should be removed. In his opinion dark leaf jats were not actually immune but less subject to severe attack.

M. H. BURTON mentioned a garden which was heavily shaded by *A*[*lbizzia*] *moluccana* and suffered badly from blister blight; upon removal of the shade trees the disease disappeared. A. C. TUNSTALL stated that blister blight was very susceptible to temperature and could not survive under warm, dry conditions [ibid., xxvii, p. 197]. In Upper Assam the campaign for the removal of centres of infection carried out many years ago was followed by the virtual disappearance of the disease. Its occurrence there is now limited to small wind-borne outbreaks which vanish with rising temperatures.

In Appendix I E. HAINSWORTH describes the past and present work on plant protection at Tocklai and outlines the work that it is hoped will be accomplished in the future. Blister blight is reported to be increasing in the Dooars.

Experiments are being made to determine the virus nature of rim blight which causes leaf mottling on tea, produces characteristic virus lesions on tobacco plants by sap inoculations, and resembles the tea phloem necrosis virus in Ceylon [ibid., xxvii, p. 339]. A type of phloem necrosis is already believed to be present in a great deal of Assam tea, but the prevailing high temperatures often mask the visible symptoms in the leaves and shoots.

Tea plants resistant to disease are being selected for inclusion in breeding schemes. Efforts are also being made to introduce improved spraying and dusting machines and to formulate four annual spraying and dusting routines.

Augier de Montgremier (Hélène), Limasset (P.), & Morel (G.). **Sur le maintien d'une maladie à virus complexe dans des tissus de Tabac cultivés in vitro.** [On the maintenance of a virus complex in the tissues of Tobacco cultivated *in vitro*.]—*C. R. Acad. Sci., Paris*, ccxxvii, 12, pp. 606–608, 1 fig., 1948.

Fragments of White Burley tobacco stems inoculated with a complex of the tobacco and cucumber mosaic viruses in October produced voluminous calluses within the next two months. They were subcultured on the same medium (one of those devised by Gautheret) [*R.A.M.*, xxvi, p. 238] every two months for a year, when six tobacco plants in the four-leaf stage were inoculated with juice from their tissues. All developed mosaic symptoms after 21 days, and nine days later two of the plants exhibited striking foliar malformations, denoting the presence of the cucumber mosaic virus. Thus, two viruses had retained their virulence for over a year in tissues cultivated in *vitro*.

Ten leaves of *Nicotiana glutinosa* were inoculated on the right of the midrib with juice from one of the tobacco plants infected with the complex as described above, and on the left with the tobacco mosaic virus maintained constantly in entire plants. The number of lesions was very considerably higher on the right side than on the left, so that there had evidently been no attenuation of the virulence of the virus in culture.

Augier de Montgremier (Hélène) & Morel (G.). **Sur la diminution de la teneur en virus (Marmor tabaci Holmes) de tissus de Tabac cultivés in vitro.** [On the diminution of the virus (*Marmor tabaci* Holmes) content in Tobacco tissues cultivated *in vitro*.]—*C. R. Acad. Sci., Paris*, ccxxvii, 14, pp. 688–689, 1948.

Fragments of young tobacco stems inoculated with the tobacco mosaic virus were grown on a medium containing naphthalene acetic acid. The initial powerful reactions of the tissues to the heteroauxin were succeeded by a loss of all sensibility to its stimulatory properties, an instance of the phenomenon of acclimatization. Another series of tests was carried out on virus-infected stems with *Agrobacterium* [*Bacterium*] *tumefaciens*, and the resultant tumours were cultured on the foregoing medium without the growth substance. The virus content of the tumour tissues was determined serologically and found to be from 30 to 40 times lower than that of virus-infected leaves, while in the acclimatized tissues it was too low to be detected except by inoculation on *Nicotiana glutinosa* and tobacco.

Limasset (P.), Levieil (F.), & Sechet (M.). **Influence d'une phytohormone de synthèse sur le développement des virus X et Y de la Pomme de terre chez le Tabac.** [Influence of a synthetic phytohormone on the development of Potato viruses X and Y in Tobacco.]—*C. R. Acad. Sci. Paris*, ccxxvii, 13, pp. 643–645, 1948.

Details are given of preliminary experiments which showed that the plant hormone 2-methyl-4-chlorophenoxyacetic acid exerts an inhibitory action on the development of potato viruses X and Y in inoculated tobacco plants. The effects were particularly striking when the inoculum and the hormone were applied simultaneously. They were, however, purely temporary and did not prevent the development of the symptoms at a later date. No significant difference was noted between the various concentrations of the hormone tested, e.g., 5, 50, or 100 parts per million.

Scaramuzzi (G.). **L'oidio del tabacco (Erysiphe cichoracearum D.C.).** [Tobacco mildew (*Erysiphe cichoracearum* D.C.).]—*Tabacco*, lii, 588, pp. 207–222, 4 figs., 1 map, 1948.

After noting a number of records of the occurrence of tobacco powdery mildew

(*Erysiphe cichoracearum*) [*R.A.M.*, xxiv, p. 123; xxvi, p. 422; xxvii, p. 201] in Italy between 1878 and 1902, the author describes the fungus, records its geographical distribution, and discusses, with numerous references to the literature of the subject, its epidemiology, the resistance or susceptibility shown to it by different tobacco varieties, and its control. The evidence would appear to indicate that the degree of resistance or susceptibility to the disease shown by different strains of tobacco depends on structural-morphological and ecological-cultural factors. Direct control may, perhaps, prove possible by the use of extremely fine sulphur products and organic derivatives of sulphur. A bibliography of 36 titles is appended.

Strong (M. C.). **New fungicides for Tomatoes.**—*Quart. Bull. Mich. agric. Exp. Sta.*, xxx, 4, pp. 407–412, 3 figs., 1948.

In tests conducted at East Lansing, Michigan, from 1945 to 1947 and in Lenawee Co. in 1946 with the tomato varieties Early Baltimore, Rutgers, Pritchard, and Wisconsin 55, five fortnightly sprays with Bordeaux mixture gave the best control of early blight (*Alternaria solani*) [*R.A.M.*, xxvii, pp. 164, 174] and *Septoria lycopersici* [ibid., xxvii, pp. 49, 120], followed by cuprocide, tribasic copper sulphate, copper zinc chromate, dithane 14, and phygon. Zerlate used with a copper spray was more effective than zerlate alone. Both zerlate and fermate controlled anthracnose (*Colletotrichum phomoides*) [ibid., xxvii, p. 435], the order in 1945 at East Lansing being fermate, cuprocide, Bordeaux, and for 1946 in Lenawee Co., zerlate, fermate, and tribasic copper sulphate alternating with fermate.

From these and similar tests conducted in other States it is concluded that phygon, the dithanes, and parzate offer dependable control of the blight diseases but are more expensive than the insoluble coppers or Bordeaux. Bioquin 1 will also control anthracnose effectively but is less effective against blight than the insoluble coppers or Bordeaux.

Felix (E. L.). **Buckeye rot-resistant Tomatoes.**—Abs. in *Phytopathology*, xxxviii, 7, p. 569, 1948.

Fruit of the following 11 tomato varieties proved highly resistant to natural and artificial infection by buckeye rot (*Phytophthora parasitica terrestris*) [*P. parasitica*: *R.A.M.*, vii, p. 60 *et passim*] at the Tennessee Agricultural Experiment Station: Yellow Pear, Fargo Yellow Pear, U.S. Regional Vegetable Breeding Laboratory Nos. T 244–0–1–4, T 244–5–3, T 244–10–3, T 244–2–10–2, T 7–013–5–52 (P.I. 79532 selection), T 510–51 (P.I. 126923–51 selection), T 994–51 (P.I. 126934 selection), T 6–02–M6, and apparent segregates of Sherbakoff's 57 × Oxheart. The last-named seems to be the most promising for further development from the standpoint of fruit size and resistance to buckeye rot, and it also displays a similar reaction to the wilt caused by *Fusarium* [*bulbigenum* var. *lycopersici*]. Sherbakoff's 57 is a highly wilt-resistant red segregate from F_2 seed of Tucker's 9–608–9 (Earliana × currant) × Break O'Day × Bison × Bison × Break O'Day.

Ploper (J.). **La 'peste negra' del Tomate y 'peste blanca' del Pimiento características y forma de lucha para disminuir los daños.** [The typical 'black pest' of Tomato and 'white pest' of Chilli and the mode of control to reduce the losses.]—*Circ. Estac. exp. agríc. Tucumán* 141, 3 pp., 1948.

A description is given of the symptoms of 'black pest' of tomato [tomato spotted wilt virus: *R.A.M.*, xxvi, p. 174] and of a very similar chilli disease known as 'white pest' in Tucumán, Argentina, together with the control measures applicable to both disorders. These are directed against the insect vector of the tomato spotted wilt virus, *Frankliniella paucispinosa*, and comprise fortnightly treatments with 2 per cent. DDT from the time the seedlings reach a height of 4 in. until transplant-

ing, after which the compound should be applied at 2·5 per cent. every 20 days. In experiments to determine the efficiency of this programme in 1947 a reduction of 70 per cent. in the losses caused by tomato 'black pest' was secured.

Chamberlain (E. E.). **Virus diseases of Tree Tomato (Cyphomandra betacea Sendt.) 1. Cucumber-mosaic (Cucumis virus 1 of Smith, 1937).**—*N.Z. J. Sci. Tech.*, A, xxix, 5, pp. 256–260, 2 figs., 1948.

One of the several virus diseases affecting the tree tomato (*Cyphomandra betacea*) in New Zealand [*R.A.M.*, xxvii, p. 116] is caused by the cucumber mosaic virus, the symptoms of which include mottling and narrowing of the leaves, reduction in the amount of foliage and crop, and dark blemishes on ripe fruit. Inoculation experiments with the cucumber mosaic virus from *C. betacea* and tomato gave positive results on tobacco, cucumber, vegetable marrow, spinach, blue lupin, and pansy and the symptoms induced by the virus from both sources were identical. The disease was transmitted from infected to healthy tree tomatoes by the aphid *Myzus persicae*. The virus is not seed-borne in *C. betacea*.

Jacks (H.). **A survey of Tomato diseases under glass.**—*N.Z. J. Sci. Tech.*, A, xxix, 5, pp. 164–169, 1947.

A recent survey of glasshouse tomato crops on a total of 64 properties in seven districts of New Zealand showed the major diseases to be tobacco mosaic virus, leaf mould (*Cladosporium fulvum*), and *Verticillium* wilt (*V. dahliae*), the total average percentages of which were 11·8, 21, and 18·3 per cent., respectively. Tomato streak virus [*R.A.M.*, xxvii, p. 587], late blight (*Phytophthora infestans*), and *Botrytis cinerea* were also prevalent, with total average percentages of 2·1, 1, and 2·6, respectively, while tomato spotted wilt virus and bacterial canker (*Xanthomonas michiganensis*) [*Corynebacterium michiganense*] were of minor importance (0·1 and 0·2 per cent., respectively), and cucumber mosaic virus, *Fusarium bulbigenum* var. *lycopersici*, and *Sclerotinia sclerotiorum* were observed in isolated cases only.

Day (W. R.). **The penetration of conifer roots by Fomes annosus.**—*Quart. J. For.*, xxxii, 2, pp. 99–101, 1948.

After reviewing his many years' studies on the penetration of conifer roots by *Fomes annosus* [*R.A.M.*, xvii, p. 714; xxv, p. 428], the author comes to the conclusion that the fungus can infect mechanically uninjured, living tissue, but that frequently other factors (e.g., impedance in drainage) can cause the death of the root bark before infection with *F. annosus* takes place. In some affected areas roots showed zones of abnormal tissue probably caused by adverse physical conditions, such as lack of oxygen or water [ibid., xiii, p. 484], which developed before fungal infection occurred. It thus appears that successful infection depends on a state of debility produced by various factors and would also explain the difficulty many workers encountered in obtaining artificial infection with the pathogen, and the fact that only parts of the root system of larger trees usually become infected. Butt rot mostly develops when sufficient roots resist infection to support the tree, but if a great part of the root system becomes susceptible even rather large trees may succumb rapidly. More experiments, however, are required to prove this hypothesis. It is suggested that *F. annosus*, besides being a saprophyte, acts as a virulent parasite on conifer roots when adverse physical conditions in the soil induce susceptibility.

Large (J. R.). **Canker of Tung trees caused by Physalospora rhodina.**—*Phytopathology*, xxxviii, 5, pp. 359–363, 1948.

In the late summer of 1944 a canker disease of tung trees [*Aleurites fordii*] caused by *Diplodia theobromae* (*D. natalensis*) [*R.A.M.*, xxvi, p. 130] was observed

in several orchards and nurseries in Louisiana and Mississippi where infected trees were found in four additional orchards during 1945 and 1946. In late summer and early autumn the trees were attacked with varying severity; in some cases the central leader branch only was affected while in others, black, sunken cankers developed on the limbs, twigs, shoots, petioles, and trunks. Both branches and trunks were frequently girdled and killed. In the following spring many of the dead branches developed ash-grey cankers covered with black perithecia, characteristic of *Physalospora rhodina* [ibid., xxii, p. 180].

In autumn, dead branches yielded pycnidia containing single-celled hyaline spores measuring 13 to 27 by 6 to 15 (average 24 by 14) μ resembling those of *Macrophoma*, while a year later several dark, bicellular spores measuring 19 to 24 by 10 to 12 (average 22 by 11) μ were observed, this change being typical of *D. natalensis* [ibid., ix, p. 650]. Cultures from spores obtained from diseased tung material and from canker margins and the black pith of the diseased branch developed a dark mycelium characteristic of *D. natalensis*. Pathogenicity of the isolates was demonstrated by the inoculation on tung seedlings through wounds. Of 60 trees, 36 were infected after 350 days, two showing symptoms within 15 days. Retro-culture was successful. Ripe apples inoculated with the tung *D. natalensis* developed typical black rot symptoms and the pycnidia yielded both the single-celled hyaline and dark bicellular spores. Cultures of *D. natalensis* reisolated from inoculated tung trees showed definite chromogenesis when grown on rice medium at 37° C. and at room temperature from 19° to 27°. Chromogenesis was also observed in cultures grown on maize meal agar and stored at approximately 17° and on potato dextrose agar held at 37°. No spores were formed on any of the five media used. The perithecia found in nature, when cut transversely, were almost snow-white and contained hyaline asci measuring 63 to 75 by 20 to 22 μ and ascospores measuring 15 to 24 by 8 to 9 μ. On the basis of these studies the causal organism of the disease is considered to be a strain of *P. rhodina*, the perfect state of *D. natalensis*.

Carter (J. C.). **Organic fungicides.**—*Proc. 23rd nat. Shade Tree Conf.*, pp. 122–130, 1947. [Abs. in *For. Abstr.*, x, 1, p. 119, 1948.]

Of 22 organic fungicides tested in Illinois [? in 1946], puratized agricultural spray (1 in 5,000) [cf. next abstract] was the most effective in controlling anthracnose [*Gnomonia veneta*: *R.A.M.*, xxvii, p. 396] of *Acer pseudoplatanus* and leaf spot [*G. leptostyla*: ibid., xviii, p. 354; xxvi, p. 186] of walnut (*Juglans nigra*). Treated leaves of the former showed about 3 per cent. infection (untreated 60), while the walnut had 1 to 20 spots per sprayed leaflet, compared with 0 to 200 on the unsprayed.

Davis (S. H.). **Organic fungicides in the control of certain shade and ornamental tree diseases.**—Abs. in *Phytopathology*, xxxviii, 7, p. 575, 1948.

In experiments at the Morris Arboretum, Philadelphia, and in Delaware, horse-chestnut and buckeye [*Aesculus* spp.] leaf spot (*Guignardia aesculi*) [*R.A.M.*, xii, p. 251] was effectively combated by treatment with Bordeaux mixture 8–8–100, zerlate 1½–100, and parzate 1½–100; hickory leaf spot (*Gnomonia ovata*) by zerlate, parzate, and puratized (1 pint–100) [cf. preceding abstract]; *Sassafras* anthracnose (*Gloeosporium fructigenum*) [*Glomerella cingulata*] by fermate (1½–100); pear leaf blight (*Entomosporium maculatum*) [*Fabraea maculata*] by bioquin 1 (copper 8-quinolinolate) and parzate; English hawthorn [*Crataegus oxyacantha*] leaf blight (*E. thuemenii*) [ibid., xxi, p. 434] by Bordeaux; and red oak [*Quercus* spp.] twig blight (*Sphaeropis* sp.) by Bordeaux and puratized. Bordeaux caused necrotic spotting of horse-chestnut, hawthorn, and oak leaves, while puratized was responsible for defoliation of *Nyssa sylvatica*.

URI (JEANNE). **Het parasitisme van Nectria cinnabarina (Tode) Fr.** [The parasitism of *Nectria cinnabarina* (Tode) Fr.]—*Tijdschr. PlZiekt.*, liv, 2, pp. 29–73, 6 diags., 1948. [English summary.]

A tabulated account is given of the researches on the parasitism of *Nectria cinnabarina* carried out at the 'Willie Commelin Scholten' Laboratory, Baarn, Holland, from 1937 to 1939 and in 1946 [*R.A.M.*, xxvi, p. 177].

The inoculation of pruning wounds on various trees and shrubs with mycelium from cherry agar cultures causes a progressive die-back of the branches. The parasitism of the mycelium persists in the young wood vessels. The inoculation of short branches or stumps occasionally results in a blackening of the bark at the base of the stump or round the wound. The black area is smaller than the discoloured, infected zone, which frequently extends into the trunk, where the older annual rings are mainly involved. This mode of inoculation may also induce die-back of the branches and of the top of the tree.

In general, inoculations with *N. cinnabarina* were found to be most effective after the close of the dormant period [ibid., xxvii, p. 188], though infection may also develop at other seasons. The pathogen tends to lose its virulence with protracted culture on artificial media. In experiments with the same virulent culture the susceptibility of the branches was found to depend on various factors. In the first place, the reactions of the hosts vary, even among related species. For instance, *Acer pseudoplatanus* and *A. pennsylvanicum* proved highly susceptible, *A. platanoides*, *A. palmatum atropurpureum*, *A. sessifolium*, *A. lobelii*, and *A. campestre* moderately so, and *A. saccharum*, *A. negundo* var. *variegatum*, *A. pseudoplatanus worlii*, and *A. cappodicum* var. *rubrum* immune. All the species of *Crataegus* tested gave positive reactions to inoculation through the branches, though the resultant symptoms were relatively mild, but attempts at infection through the roots were unsuccessful. *Carpinus betula* reacted negatively to inoculation and peach was practically immune, but horse-chestnut and *Robinia pseudacacia* were susceptible and the effects were of remarkably long duration. Both black and red currants were resistant, especially the former. All the species of elms tested were susceptible, especially *Ulmus pumila*.

As indicated above, seasonal factors are also concerned in the responses of the various hosts to infection by *N. cinnabarina*: in this connexion the wood vessels, and the enzymes affecting their formation, are probably of importance. Thick branches and trunks, once infection is established, die off more rapidly from the top downwards than thin, one-year or two-year branches. Newly transplanted trees were less susceptible to inoculation than those left *in situ*, while root-pruning and shade also conferred a degree of protection against *N. cinnabarina*.

The reactions of the trees to the presence of the fungus in their wood vessels include discoloration of the middle lamellae, followed by that of the fibres and secondary walls; secretion of gum; formation of tyloses pending the development of wound tissue and (in peach and elm) of lacunar vessels between the medullary rays; swellings of the cortical parenchyma; and production of secondary cambium layers to isolate the wounds by means of sound new tissue.

Cultures of *N. cinnabarina* in liquid media produce a thermostable substance which inhibits the growth of *Pythium debaryanum*, the most actively parasitic mycelia forming the most powerfully inhibitory substance within the shortest period (six days). Modifications in the degree of parasitism were further expressed, for instance, by a retardation of the mycelial growth rate, a cartilaginous consistency, a reddish-brown coloration, or incapacity for spore formation, while in most cases perithecia were also absent.

The dark red, fertile stromata were usually formed after the death of wood with a succulent cortex in shady, damp sites. They arose during the summer, and for the most part bore perithecia in the course of the same season. Sporodochia might

also be formed on the stromata, but perithecia developed exclusively on the dark red ones.

N. cinnabarina readily enters its hosts through spring pruning wounds, on which bleeding sap occurs. The spores may be carried on the knives, which should therefore be disinfected after each cut. Pruning should be deferred until August and the wood bearing sporodochia removed. It is considered inadvisable to excise crustaceous cankers or cut back wilting branches.

[An amplified description of these studies (88 pp.) is presented in the form of a thesis of the University of Utrecht, 1948, in which the literature cited in the bibliography of 80 titles is summarized.]

Went (J[ohanna] C.). **Verslag van de onderzoekingen over de Iepenziekte en andere boomziekten, uitgevoerd op het Phytopathologisch Laboratorium 'Willie Commelin Scholten' te Baarn gedurende 1947.** [Report on the investigations on the Elm disease and other tree diseases conducted at the 'Willie Commelin Scholten' Phytopathological Laboratory, Baarn, during 1947.]—*Meded. Iepenziektecomité, Baarn*, 43, 15 pp., 1948. [English summary.]

In former trials of the reaction of different types of elm seedlings to inoculation by *Ceratostomella ulmi* [*R.A.M.*, xxvii, p. 166] the small-leaved *Ulmus foliacea* was more resistant than the same species with medium-sized or large leaves, but this trend, for some reason unknown, was not apparent in 1947. The use of selected lines of *U. foliacea*, *U. glabra* No. 49, *U. hollandica vegeta*, and *U. pumila pinnatoramosa* as parents in crosses conferred the maximum degree of resistance on the progeny. The percentages of infection contracted by *U. foliacea* No. 62, 132 *U. hollandica* No. 5, and 138 *U. hollandica vegeta* × *U. foliacea* No. 1 were 13·7, 6·2, and 4·7, respectively. No. 62, a French seedling, was to be distributed to nurseries in 1948. These selections were also free from the die-back caused by *Nectria cinnabarina* [see preceding abstract].

Small-scale experiments were carried out to determine the value of *para*-nitrophenol injections for the control of *C. ulmi* as recommended by Zentmyer *et al.* in the United States [ibid., xxvi, p. 430]. The slight beneficial effect of the chemical was counteracted by its destructive action on the bark above and below the site of introduction.

Rhizosphaera [*kalkhoffii*] and a *Phoma* sp. were again isolated from diseased *Picea abies* needles. Inoculation experiments have so far given negative results.

A brief description is given of the oak disease caused by *Diplodia quercina* in Belgium [ibid., xxv, p. 51].

Heim (R.), Moreau (C.), Moreau (Mireille), & Jacquiot (C.). **Une affection chancreuse de l'Okoumé au Gabon.** [A canker-forming disorder of 'Okoumé' in the Gabon.]—*Rev. Mycologie, Suppl. colon.*, xiii, 1, pp. 13–28, 2 pl. (facing p. 48], 9 figs., 1948.

Aucoumea klaineana trees recently planted in the vicinity of Libreville, Gabon [French Congo], have shown a form of canker causing branch necrosis and sometimes killing the trees. Very young branches with no apparent lesions developed small black pustules on the surface in humid conditions. Larger branches, petioles, and some of the leaf veins bore more conspicuous tumours, either scattered or very close together. Old branches bore on the surface coalescent papillae usually with a central depression and resembling cankers. Sections through the cankers showed only the spores of a species of *Pestalozzia* [*Pestalotia*]. Septate hyphae were found in the wood.

Isolations from affected material gave the *Pestalozzia* and in some cases *Hypomyces ipomoeae* [*R.A.M.*, xvii, p. 297; xx, pp. 100, 257], the former, apparently, causing the disease. This fungus is named *P. aucoumeae* n.sp. [without a Latin

diagnosis]. On maize agar acervuli were formed after three or four days at 22° C. The sooty-brown spores measured (not counting the pedicel or the filiform appendages) 25 to 40 by 6 to 9 μ. The thin basal pedicel was usually 3 to 6, occasionally up to 10 μ long, and the three filiform apical appendages 25 to 35 μ. There were usually four (rarely two to seven) septa.

H. ipomoeae (referred to f. 1) produced on maize agar microconidia of the *Cephalosporium* type, macroconidia identical with those of *Fusarium javanicum* var. *radicicola* (the conidial form of *H. ipomoeae*), chlamydospores, and perithecia.

Anatomical examination showed that the attack had provoked strong reaction in the suberophellodermic layer while the cambial layer continued to function normally. The cortex, wood, and phloem reacted by abnormal secretion of oleoresin and tannins and by the formation of tyloses obstructing the wood vessels.

Hyttinen (A.) & Schafer (E. R.). **Groundwood pulping of Quaking Aspen.**—*Paper Ind.*, xxx, 3, pp. 405–407, 1948.

The results of groundwood pulping trials on quaking aspen [*Populus tremuloides*] at the Forest Products Laboratory, Wisconsin, indicate that decay [of unspecified origin] appreciably affects the brightness and slightly modifies the bursting and tearing strengths and average fibre length of the pulp in inverse proportions to the amount of infection present (ranging from 0·6 to 25·4 per cent. advanced and 3·6 to 31·5 per cent. incipient, by volume) in a lot of five disks, 1 in. thick, cut from the ends of selected 6 in. dry blocks, and from 0 to 15 and 0·3 to 4·4 per cent., respectively, in a similar lot of four wet disks. The estimated decrease in brightness was from 64·7 to 46·2 per cent. in the dry and from 66·5 to 46·7 in the wet series. The greater proportions of decay also introduce substantially larger quantities of dirt. The decay exerted little or no effect on grinding rate, energy consumption, or tensile strength.

Bescher (R. H.). **Treated wood combats mill decay.**—*Text. World*, xcviii, 7, p. 131, 1 fig., 1948.

In the early days of textile mills durable pine heartwood was generally used for their construction and artificial humidification was unknown. During the last few decades pine heartwood has become unobtainable, and the advent of humidification has provided the requisite warmth and moisture for the luxuriant development of fungi in the roofs, thereby reducing the life of the latter to a very short span indeed and necessitating preservative treatment. The first pressure treatments were made with zinc chloride, which has been improved by the joint efforts of Koppers and Du Pont and was introduced in 1939 as chromated zinc chloride. This clean, paintable, permanent, and safe product is now widely used in the United States, not only for the protection of roofs but also in two of the three floor layers. A final net retention of 1 lb. dry salt per cu. ft. wood is recommended for the control of decay and termites, while an additional 1½ lb. will confer fire-retardant properties at a cost of only $15 more per 1,000 board ft. than for the decay prevention treatment alone.

Dunkelberg (G. H.). **Fence post preservation.**—*Agric. Engng, St. Joseph, Mich.*, xxix, 4, pp. 152–153, 156, 1 fig., 6 graphs, 1948.

An account is given of an investigation started in 1940 at the South Carolina Agricultural Experiment Station to determine the efficiency of fence post preservation against termites and [unspecified fungal] decay by the 'trough' or sap stream displacement method, using copper sulphate and zinc chloride (plain and chromated) on shortleaf and longleaf pine [*Pinus echinata* and *P. palustris*, respectively]. By this method green, freshly cut posts with the bark intact are placed with the butt end in the solution and the salts move slowly upward. After sufficient absorption has taken place the post is inverted and the top end placed in the solution. When

treatment is complete the posts are stacked butt end up and allowed to dry when the solution moves by gravity throughout the post. In 1947, 53 per cent. of the shortleaf pine posts treated with zinc chloride in 1940 were free from any kind of decay and 50 per cent. in the copper sulphate series were also in good condition, whereas all the controls were unserviceable by 1945. A prolonged period of air-drying was found to be advantageous after zinc chloride, but with copper sulphate seasoning after treatment was apparently immaterial. All the longleaf pine posts treated with zinc chloride were classed as sound in 1947, the corresponding figure for copper sulphate being 60 per cent.; all but one of the controls had failed by 1945. In both species termites were the major factor in the failure of the untreated posts and fungal decay in that of the treated.

Copper sulphate was shown to be severely corrosive to steel wire and staples, over 60 per cent. of the latter used as fasteners on the shortleaf pine posts treated with this compound had failed at the seven-year inspection, whereas zinc chloride was relatively innocuous.

The results of absorption studies initiated in 1941 and 1942 showed that the most effective concentration of copper sulphate throughout the entire post resulted from four days' immersion of the butt and three of the top, followed by curing with the butt upwards. This method also conferred a longer service life than treatment of the lower end alone.

The economic aspects of the trough mode of treatment have not yet been fully elucidated, but labour requirements are very modest and the cost of the preservatives is low, averaging 6 to 10 cents. per lb., a sufficient quantity for an ordinary-sized post.

Pound (G. S.) & Walker (J. C.). **Strains of Cucumber mosaic virus pathogenic on crucifers.**—*J. agric. Res.*, lxxvii, 1, pp. 1–12, 6 figs., 1948.

A study made at Wisconsin Agricultural Experiment Station of the pathogenicity of two closely related virus strains (X1 and X2) each causing a mosaic disease of dame's violet (*Hesperis matronalis*), identified both as strains of cucumber virus 1 [cucumber mosaic virus: *R.A.M.*, xx, p. 334]. They were found to be infectious to all members of the Cruciferae tested, including 19 species in ten different genera. Cultivated crucifers, in particular economically important *Brassica* spp., merely acted as symptomless carriers or showed very mild symptoms. Strains X1 and X2 between them affected every species tested except bean (*Phaseolus vulgaris*). Only mild or local symptoms appeared on squash, pumpkin [ibid., xxvii, p. 116], muskmelon, pea, and cucumber (X2 only), and also on tobacco and tomato with very little or no distortion. In view of the similarity between the physical properties of both viruses (inactivated at a dilution of 1 in 100,000, after ten minutes at 70° C., and *in vitro* after four to five days at 20°) and those of the cucumber mosaic virus and the fact that strain X1 effectively immunized *Zinnia* plants against Price's strain 6 of the cucumber mosaic virus [ibid., xiv, p. 812], it appears logical to consider them both as strains of this virus.

Harland (S. C.). **Inheritance of immunity to mildew in Peruvian forms of Pisum sativum.**—*Heredity*, ii, 2, pp. 263–269, 1948.

Locally grown peas collected by the author in 1943 at Huancabamba, a small isolated Andean town in northern Peru, when sown in the garden of the Institute of Cotton Genetics, Lima, were for the most part severely attacked by mildew (*Erysiphe polygoni*) [*R.A.M.*, xxvi, p. 1], which, except in the middle of the cold season, is a limiting factor in pea cultivation on the coast. Some 10 per cent. of the plants remained immune.

Studies are described on the mode of inheritance of this immunity from what is presumably a Peruvian race of *E. polygoni* and of the linkage relationship of im-

munity to flower colour in crosses with the susceptible variety First of All. The results showed that susceptibility to *E. polygoni* in the Peruvian form of pea is governed by a single dominant gene (*Er*). Evidence of linkage between *A* (purple flower and pigmented axil) and *Er* was obtained. Should this immunity be retained when this pea variety is grown in Europe and North America it could readily be transferred to all present commercial varieties by repeated back-crossing and selfing. The fact that in Peru *Pisum* is a partially cross-fertilized plant is important.

Pound (G.S.). **Horse-radish mosaic.**—*J. agric. Res.*, lxxvii, 4, pp. 97–114, 9 figs., 1948.

A survey of commercial horse-radish plantings in Wisconsin, Illinois, Missouri, and Washington revealed that they were severely infected with mosaic [*R.A.M.*, xii, p. 351], infection practically reaching 100 per cent. The diseased plants show in the spring a yellow-green, chlorotic, blotchy mottling (sometimes preceded by vein-clearing) which may later become diffuse with chlorotic spots and bright yellow. Necrotic ringing is common in the late season, the necrosis developing at the periphery of the chlorotic spots. Necrotic flecking and streaking of petioles and leaf veins is also prevalent, the necrosis extending to the roots, giving them a flecked appearance in transection. The originally broad leaves often become pinnatifid, and ultimately reduced to extreme fern-leaf structures. As this condition has also been found among plants from which no virus could be isolated, its relationship with the mosaic disease is not clear.

Seven horse-radish isolates agreed very closely with cabbage virus A [ibid., xxiv, p. 438; xxvii, p. 269] and cabbage black ring spot virus [loc. cit.] in their properties and host range, although there were slight differences. They had, however, several group reactions that distinguished them from the cabbage viruses, e.g., on annual stock (*Matthiola incana* var. *annua*) they were all markedly more severe; on *Brassicae* they produced circular chlorotic or necrotic rings and ring spots instead of diffuse mottling. They differed in their host range from Tompkins's turnip mosaic virus [ibid., xviii, p. 223], from radish mosaic virus [ibid., xviii, p. 427], from the two mosaic viruses of annual stock [ibid., xviii, p. 459], and from the turnip virus T1, T6, and T9 [ibid., xxiv, p. 438]. Furthermore, the horse-radish isolates also differed from one another (HR1 did not infect Snowball cauliflower, only HR2 infected *Solanum integrifolium*) especially in symptom expression and intensity.

Cross-immunity tests demonstrated a strain relationship between the horse-radish isolates and cabbage virus A, and they are therefore designated as strains of turnip virus 1 [turnip mosaic virus].

Goossens (J.). **Een voor ons land nieuwe vaatziekte der Erwten.** [A vascular disease of Peas new to our country.] —*Tijdschr. PlZiekt.*, liv, 2, pp. 75–80, 4 figs., 1948. [English summary.]

The agent of a vascular disease causing the premature death of field peas on Dutch farms in 1944, 1946, and 1947 was identified at the Centraalbureau voor Schimmelcultures, Baarn, as *Fusarium orthoceras* var. *pisi*, a new record for Holland. The more conspicuous symptoms of the foot rot due to the prevalent *Ascochyta pinodella* tend to obscure the graver effects of the wilt pathogen, which call for closer investigation. In a trial laid out in quadruple in a severely infested field, five out of the 11 varieties, namely, Rondo C.B., Unica, Parel C.B., Mansh[olt] G.E.K., and Stijfstro C.B., and a selection, (C × W.H.) × Zelka, proved highly susceptible, while three varieties, Hala Capucijner, Zelka Schokker, and Zelju Schokker, and two selections, Zelka × Mansholt Schokker and Hala × Unica, were extremely resistant, yielding 16·8 to 18·4 kg. per 30 sq. m., according to the variety, compared with nil for the six susceptible types.

Van der Want (J. P. H.). **Het stippelstreep van de Boon (Phaseolus vulgaris), een ziekte veroorzaakt door een virus, dat in de grond overblijft.** [Stipple streak of the Bean (*Phaseolus vulgaris*), a disease caused by a soil-borne virus.]—*Tijdschr PlZiekt.*, liv, 3, pp. 85–90, 4 figs., 1948. [English summary.]

Field experiments showed that the virus responsible for stipple streak of beans (*Phaseolus vulgaris*) in Holland [possibly identical with tobacco necrosis: *R.A.M.*, xxv, p. 90] persists in the soil, which may, however, be sterilized by 30 minutes' steaming at 100° C. Natural infection may develop in young plants within a week after sowing in contaminated soil, but the symptoms of stipple streak do not appear until considerably later; in 1947, for instance, they were first observed six weeks after the seedlings had been transferred (a week after sowing) from infested to clean soil. Plants germinated in steam-sterilized soil may contract the disease on planting out in contaminated ground.

Hubbeling's unpublished data on the *in vitro* properties of the bean virus were confirmed. The thermal inactivation point lies between 85° and 90° and the dilution end point between 10^{-5} and 10^{-6}; the virus withstands desiccation.

Inoculation experiments with the stipple streak virus on Sumatra Mietlinskaja tobacco leaves resulted in the development of local necrosis, often in the form of concentric rings.

Machacek (J. E.) & Brown (A. M.). **Experiments on vegetable seed disinfection and observations on varietal resistance of Beans, Peas, and Sweet Corn to some diseases in Manitoba.**—*Sci. Agric.*, xxviii, 4, pp. 145–153, 1948.

Owing to the increased demand for vegetable seed and disinfectants during the war and the fact that there was little experimental evidence available regarding the value of vegetable seed disinfection under Manitoba conditions, experiments were made from 1942 to 1946 to determine which of the newer seed disinfectants were suitable for the treatment of peas [*R.A.M.*, xxvii, p. 213], a crop of increasing importance in Manitoba; whether the cereal seed disinfectants used in Canada were suitable for vegetable seed; which vegetable crops were most likely to benefit from seed treatment; and which varieties of beans, peas, and maize were most resistant to their more common pathogens in Manitoba.

Trials with various disinfectants under field conditions showed that in 1943 new improved ceresan at 1 and 1·5 oz. per bush., arasan at 1·5 oz. per bush., and U.S.R. 604 at 2 oz. per bush. gave 87·2, 88, 75, and 85·4 per cent. germination, respectively, in one lot, and 81·2, 86·1, 71, and 80·5 per cent. in the other, against 51·7 and 46·2 per cent., respectively, for the untreated. The yield of harvested seed in 1943 was increased by all disinfectants in one lot of seed but not in the other. In 1944 and 1945, however, none of the disinfectants increased either germination or yield.

In a greenhouse experiment treatment with excess dust composed of new improved ceresan diluted with twice its volume of talc greatly increased the percentage germination of beet, cucumber, muskmelon, pea, [chilli] pepper, pumpkin, spinach, squash, and watermelon. Bean and maize benefited in the increased vigour of the seedlings.

Field trials with the same lot of bean, pea, and maize seed treated with talc-diluted new improved ceresan and sown in 1944, 1945, and 1946 showed that the old seed of both peas and maize tended to benefit from disinfection relatively more than fresh seed but the germinability of both treated and untreated seed tended to decrease with age.

In spring 1944, stem girdling of beans [*Phaseolus vulgaris*] due to *Rhizoctonia* [*Corticium*] *solani* developed abundantly; Navy and Great Northern were conspicuously resistant. Dwarf Horticultural, Flageolet, Kentucky Wonder Pole, Medal Refugee, Stringless Green Refugee, and White Marrowfat usually showed the least halo blight (*Pseudomonas medicaginis* var. *phaseolicola*). The pea varieties

Dwarf Alderman, Dwarf Grey Sugar, Everbearing, Improved Stratagem, Onward, and Radium showed the least mildew (*Erysiphe polygoni*), which was abundant in 1945 and 1946, Onward being particularly resistant.

MOORE (W. D.). **Weather and the incidence of Sclerotinia sclerotiorum on vegetables in South Florida from 1944 to 1948.**—*Plant Dis. Reptr*, xxxii, 9, pp. 380–382, 1948. [Mimeographed.]

Investigations carried out in South Florida from 1944 to 1948 into the effects of weather on the incidence of *Sclerotinia sclerotiorum* [*R.A.M.*, xxvi, pp. 123, 520] on beans [? *Phaseolus vulgaris*] showed that both temperature and moisture during the midwinter growing-season were favourable for the initiation of the disease. Further spread and subsequent severity of infection appeared to be limited by the weather conditions following its first appearance.

During the period under review the disease appeared each year in the first half of December; it was most severe at temperatures of 60° to 70° F. and in wet seasons, when it caused losses up to 100 per cent. The number of viable sclerotia, however, must also play a part and the conditions influencing them require evaluation.

GAROFALO (F.). **L'influenza dell' umidità dell' aria sulla germinazione e sul parassitamento delle uredospore di Uromyces fabae nell' ospite.** [The influence of atmospheric humidity on the germination and parasitism of *Uromyces fabae* in the host.]—*Riv. Biol.*, xl, pp. 44–47, 1948.

In studies on the germination of the spores of *Uromyces fabae*, uredospores were placed in oblong glass containers in which the relative atmospheric humidity was maintained at 100, 99, 95, 90, 88, and 80 per cent., respectively, at 20° to 25° C. After 24 hours the spores in the high-humidity conditions showed high germination, the promycelium averaging 18 to 20 μ; those at 95 per cent. showed 70 per cent. germination, the promycelium measuring 10 to 15 μ; at 90 and 88 per cent. germination was reduced, while at 80 per cent. it was sparse or absent.

When uredospores of *U. fabae* were placed in contact with the leaf blades of broad bean seedlings in pots in the same containers with relative atmospheric humidity ranging from 100 to 50 per cent., after 24 hours it was found that these conditions had favoured germination and infection [cf. *R.A.M.*, xviii, p. 49]. It was also found that germination and the initiation of infection were markedly affected by the temperature conditions, which altered the humidity of the substrate. Also, when inoculated seedlings were placed in completely dry conditions at 22°, the uredospores germinated on the leaves after 48 hours; when the temperature was raised to 28° a high percentage of germination occurred after 26 hours, the increased transpiration of the leaves at the higher temperature giving the spores greater humidity.

WENZL (H.). **Raps Kräuselkrankheit in Österreich.** [Colza curl disease in Austria.] —*PflSch. Ber., Wien*, ii, 11–12, pp. 183–185, 1 fig., 1948. [English summary.]

A virus disease of colza first reported in mid-April, 1948, from the Krems district of Lower Austria was found on examination of the affected plantings to agree in all particulars with those of the curl described by Kaufmann in 1936 from north-west Germany [*R.A.M.*, xvi, p. 10]. The symptoms comprise dwarfing, curling, mosaic spotting, and premature dying-off of the foliage, stunting of the stalk and siliquae, and thickening of the root-collar.

SMITH (F. F.) & BRIERLEY (P.). **Aster yellows in Shallot and Gladiolus.**—*Phytopathology*, xxxviii, 7, pp. 581–583, 1 fig., 1948.

In addition to onions [*R.A.M.*, xxiv, p. 372; xxv, p. 242], two further monocotyledons have been found susceptible to the aster yellows virus, namely, shallot and

gladiolus. E. C. Tims has reported the occurrence of up to 5 per cent. of a disease believed to be aster yellows in commercial shallots in Louisiana (*Plant Dis. Reptr*, xxx, pp. 335–338, 1946). The affected bunches were bright yellow, unmottled, and had slender leaves. No bulbs were formed, so that the disease in this host is virtually self-eliminating. The virus was transmitted from Mary Lennon Hall and Silver Ball chrysanthemums to one out of ten shallots through the agency of ten six-spotted leafhoppers (*Macrosteles divisus*), which were fed on the source plants from 2nd to 8th December, 1946, then moved to China aster until the 16th, when they were transferred for the next two days to the shallots. On 27th February, 1947, the infected plant appeared to be rather more slender and erect than normal and uniformly bright yellow. Although reisolation was not attempted, the close duplication of natural symptoms in this plant is considered to afford convincing proof that the virus was that of aster yellows. The insect vectors became established more readily on shallot than on onion, hence the disease is likely to be more troublesome on the former than on the latter.

In August, 1946, the writer's attention was drawn by W. D. McClellan to a single virescent Picardy gladiolus spike out of thousands of normal ones in his plot at Beltsville, Maryland. All the flower parts remained green, but no proliferation was observed. The flowers ultimately turned yellow and shrivelled without developing the usual pink coloration. The gladioli of a seedling clone were exposed from 2nd to 8th December, 1946, to ten viruliferous *M. divisus* leafhoppers from chrysanthemum, and on the following 1st February one plant showed uniformly yellowish-green leaves and a spindling, green flower spike. On the 24th a second plant developed the same symptoms. Both turned straw-yellow and withered prematurely without showing any pink coloration in the flowers. The corms of the experimentally infected plants were still sound on 20th June, 1947, and were beginning to produce new shoots with yellows symptoms. The virus was readily transmitted from the diseased gladioli to China asters by means of *M. divisus*. Forty non-viruliferous nymphs were placed on five asters on 8th March, 1947, after two days' feeding on an infected gladiolus flower, and by 11th April all the plants had developed typical yellows symptoms. The rarity of the disease on gladiolus is surprising since *M. divisus* is frequently found on this host in the field.

MOHANTY (U. N.). **The wilt disease of Pigeon Pea (Cajanus cajan (L.) Millsp.) with special reference to the distribution of the causal organism in the host tissue.**—*Indian J. agric. Sci.*, xvi, 4, pp. 379–390, 1946.

Studies in India of pigeon pea plants affected with wilt (*Fusarium udum*) [*R.A.M.*, xxvi, pp. 44, 440, and see above, p. 5] showed that the spore masses on the branches of infected plants always occur considerably below the point of internal fungus distribution, and it is concluded that they arise as a result of the outward spread of the pathogen and not as a result of superficial infections of the aerial parts. The conidia may retain their viability for more than five months, germination at the end of this period being highest at the lowest storage temperature (31·8, 20, and 9·4 per cent. germination after 15 hours at 30° C. in samples stored at 10°, 20°, and room temperature, respectively).

There was no indication that *F. udum* is carried in the seed.

HATFIELD (W. C.), WALKER (J. C.), & OWEN (J. H.). **Antibiotic substances in Onion in relation to disease resistance.**—*J. agric. Res.*, lxxvii, 4, pp. 115–135, 1 fig., 1948.

During 1944–7, white, red, yellow, and brown onion varieties, with mild and strongly pungent types within the first three colour groups, were tested for resistance under field conditions to smudge (*Colletotrichum circinans*) [*R.A.M.*, xxv, p. 380], neck rot (*Botrytis allii*) [ibid., xxv, p. 534], and black mould (*Aspergillus*

niger) [ibid., xxvii, p. 250]. Although coloured varieties were in general more resistant to smudge [loc. cit.], there were some exceptions. Pungency appeared to have an effect on varietal resistance as strongly pungent varieties showed in several seasons considerably lower smudge indices than the mildly pungent ones.

Bio-assays of the volatile and non-volatile antibiotics in the fleshy scales of the varieties failed to show a definite correlation between toxicity and smudge index. There was no correlation between content of volatile sulphur and pungency, or between sulphur and toxicity of the volatile antibiotics.

In the coloured varieties there was a significant correlation between the 'poor outer scale' character (easily sloughing) and high smudge index, the outer scale character being regarded as a most important one modifying the smudge resistance of coloured varieties, due primarily to the phenolic antibiotics in the outer scales.

There was no correlation between resistance to neck rot and colour, but a definite correlation between strong pungency and resistance, and between resistance and the toxicity of the volatile and non-volatile antibiotics in fleshy scales.

In one season the coloured varieties showed a markedly higher incidence of black mould than the white ones. The most deeply coloured, Australian Brown, had the highest rate of infected bulbs in two out of three seasons in which the disease was prevalent. The extract of dry outer scales distinctly stimulated germination and growth of *A. niger*. In this case the same phenolic substance involved in the resistance to smudge and neck rot appears to contribute to black mould susceptibility in coloured varieties.

When each of the three organisms gains access to the fleshy scales there is no correlation between colour and resistance, but the three species show different degrees of pathogenicity. *A. niger* is a very weak pathogen, and is little more than a saprophyte on the dry outer scales, *C. circinans* is slightly more aggressive, but still a relatively slow invader, and *B. allii* is an aggressive and fairly rapid pathogen. Of the three fungi the first is the most sensitive to the non-volatile antibiotics of the succulent scales, the second less sensitive, and the third least of all. In the case of the volatile antibiotics *C. circinans* was the most sensitive, *A. niger* next, and *B. allii* was again the least sensitive.

It is suggested that the antibiotics in the fleshy scales may have an influence on the relative resistance of the tissue to the three organisms.

Vasudeva (R. S.), Raychaudhuri (S. P.), & Pathanian (P. S.). **Yellow mosaic of Lettuce.**—*Curr. Sci.*, xvii, 8, pp. 244–245, 1 fig., 1948.

In 1946–7 lettuce plants grown at New Delhi became affected by a yellow mosaic. In 1947–8 the disease was severe and 50 to 80 per cent. of the plants were affected. The first visible symptom in the field is vein-clearing of the youngest leaves, associated with pale yellow mosaic mottling. The symptoms gradually become more marked and the lamina develops distortion. The old infected leaves are thick and leathery with chlorotic areas along the margins. In severely affected plants the leaves are unfit for table use. Artificially inoculated greenhouse plants developed symptoms in six to eight days.

That the virus is sap [? seed]-transmissible was demonstrated by the fact that in 1946–7 about 5 per cent. of the plants raised under controlled conditions from seed obtained from the local market became affected, while the following year infection in plants raised from the seed of infected plants reached 30 per cent.

The virus remains infective after exposure for ten minutes at 86° C., but not at 87°, and after 60 but not after 64 days at 15° to 25°. Crude juice from affected plants was infective at a dilution of 1 in 60,000 but not at 1 in 70,000.

The disease was transmitted to Harrison's Special and White Burley tobacco, and Sutton's Early Market tomatoes. In Harrison's Special tobacco, mottling and

vein-thickening were conspicuous symptoms, while in White Burley small elliptical pale yellow patches developed, becoming more pronounced in 25 to 30 days. In tomato the disease produced yellow mosaic mottle and vein-thickening. Blistering, common in severely affected lettuces, was not observed in tobacco or tomato. All attempts to infect sweet peas were unsuccessful.

Jagger reported a seed-transmissible lettuce mosaic from Florida (*J. agric. Res.*, xx, pp. 737–740, 1921), but this had a thermal death-point of between 55° and 60°, a longevity *in vitro* of 24 to 28 hours, and a very low dilution end-point. Lettuce mosaic virus (*Lactuca* virus 1) [*R.A.M.*, xxvii, pp. 116, 214] is readily transmissible to sweet peas. All the other mosaic diseases reported on lettuce appear to differ in their symptoms from the one described in the present paper.

Taylor (R. E.) & Dillon Weston (W. A. R.). **Celery 'blight'. The need for clean Celery.**—*J. Minist. Agric.*, lv, 5, pp. 201–203, 1948.

Increasing concern has been felt by celery-plant raisers and growers in the Isle of Ely during recent years at the continued destructiveness of celery leaf spot [*Septoria apii-graveolentis* and *S. apii*: *R.A.M.*, xxvii, pp. 59, 127] and the difficulty of obtaining disease-free seed. Examination was made, therefore, during 1947 of 106 random seed samples obtained from retail seedsmen throughout the country and the percentage infection on 100 seeds from each sample recorded when 10 per cent. or over were infected and on 250 seeds when infection was under this figure. Only seven of the samples examined were free from infection, 16 had over 50 per cent., and the average figure for all the rest was 21 per cent. No correlation was found to exist between the district of purchase and the amount of infection. This survey indicates that a marked improvement in the health of commercial seed must be obtained before any abatement in the large annual losses due to leaf spot can be expected. It is suggested that the introduction of voluntary certification of the cleanliness of seed prior to harvesting combined with an obligation on the part of the seedsman to state the degree of infection in all the seed sold would do much towards ensuring that leaf spot is no longer a limiting factor in the production of healthy celery crops.

Parris (G. K.). **Watermelon disease control.**—*Proc. Fla hort. Soc., 1947*, pp. 147–150, 1947.

The following are the most common diseases of watermelon in Florida: *Fusarium* wilt (*Fusarium oxysporum* [*bulbigenum*] f. [*var.*] *niveum*) [*R.A.M.*, xxvii, p. 405], gummy stem blight (*Mycosphaerella citrullina*) [ibid., xxv, p. 23], anthracnose (*Colletotrichum lagenarium*) [ibid., xxv, p. 24], which is most destructive, and downy mildew (*Peronoplasmopara* [*Pseudoperonospora*] *cubensis*).

Fusarium wilt can be controlled only by using resistant varieties [ibid., xxvii, p. 8] on land that has not carried melons for two or three years; Leesburg [ibid., xxi, p. 442], Blacklee [ibid., xxvii, p. 405], and Improved Leesburg and Brownlee (not yet released), all bred by the Florida Agricultural Experiment Station, Leesburg, are highly wilt-resistant. For the control of gummy stem blight and anthracnose seed treatment with spergon or semesan (both at 0·3 per cent.) is recommended. If sprouted seeds are planted a treatment with mercuric chloride (1 in 1,000), followed by thorough washing, is equally effective. Some seed houses in Florida are selling treated seed and this practice should be more widely adopted. Dusting with dithane–zinc–lime or tribasic copper sulphate is recommended for the control of anthracnose; against downy mildew zerlate, dithane, copper A, tribasic copper sulphate, and copper-lime are all effective, but more trials are needed to determine appropriate schedules.

A disease-forecasting service for watermelon-growers is recommended.